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ERRATA.

Vol. 33, No. 2, p. 111, in first line of summary of paper by STÉVENEL & BERNY on the destruction of hookworm eggs and larvae, for cyanide of calcium read cyanamide of calcium.

Vol. 33, No. 7, p. 561, in first line of summary of paper by IZUMI on a new species of *Metagonimus*, for *Metagonimus katuradai* read *Metagonimus katsuradai*.

Vol. 33, No. 12, p. 942, translation of title of PEREIRA's paper should read "Witebsky, Klingenstein and Kuhn Test in Leprosy."

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[No. 1.

THE CARRIAGE OF SCHISTOSOMES FROM MAN TO MAN, WITH SPECIAL ATTENTION TO THE MOLLUSCS WHICH ARE THEIR LARVAL HOSTS IN DIFFERENT PARTS OF THE EARTH.¹

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Sectional Editor, Tropical Diseases Bulletin.

(Received November 4, 1935.)

That, against the view of Looss, molluscs take a necessary part in the development of schistosomes came sharply to the front with the statement by KUMAGAWA (1914, 3, 289-90)² of Miyairi's discovery of a larval stage of *Schistosoma japonicum* in a "*Lymnaeus*" species. LEIPER and ATKINSON (1915, 6, 296) were unable to get Miyairi's paper through good bookstores in Japan, but their investigations there made it clear that the development of this trematode from miracidium to cercaria took place in a mollusc, named in an addition to their paper *Katayama nosophora* Robson, 1915, after the place from which it had come. While in 1907 SAMBON³ had, from its form, given the name of *S. mansoni* to the egg with a spine at the side, it was Leiper (1916, 7, 347) who gave proof, not only that the two sorts of egg came from worms which when of full growth had a different structure, but that the carriage of the two species from man to man took place in Egypt by

¹ But for the words necessary for biology, parasitology and medical science, which have not so far been covered by the system, this paper "unless otherwise indicated thus" is in Basic English, keeping to 850 words in the general list and those in the short special lists for general science and chemistry or in general international use. The writer is of opinion that only in some such way may material in this *Bulletin* be made of the most value for those whose language is not English. He is under a strong sense of debt to Professor C. K. OGDEN and Miss L. W. LOCKHART (of the Orthological Institute, 14, Dartmouth Street, London, S.W. 1, and 10, King's Parade, Cambridge) for most kind help on this point now and in the past.

References, unless otherwise stated, are to summaries in this *Bulletin*, the first figures giving the year, the second, in blackface type, the volume number, and the third the page of the *Bulletin* containing the summary in question. Where the year of publication of the original paper differs from the year of publication of the *Bulletin* summary, two dates are given—the first in brackets referring to the original paper, and the second to the *Bulletin* summary.—Ed.

J. Soc. Public Health, 15, 303.

molluscs which zoological grouping had placed in different genera. Now the units of zoological grouping are man-made, and the ideas of different men on the facts which may rightly be used for this purpose, are not the same. The base used here is individual and anatomical, such as that put by SANDGROUND ((1934) 1935, 32, 300) in these words: "In order to establish a new species safely, it is necessary to point out constantly present, and if possible easily recognizable, zoological characters by which it may be distinguished from related forms." Zoology is one, and though there is a division into such "races" as Hebrew and Nordic, Hottentot and Negro, Mongol and Latin, *Homo sapiens* in the view of anthropologists is *one species*; and the same range of qualities in the species has to be kept even for molluscs and worms.

The best chain of facts which may be offered in support of the view that a certain mollusc is the intermediate or larval host of a certain schistosome is that put forward by GORDON, DAVEY and PEASTON ((1934) 1935, 32, 237). Their molluscs were of laboratory growth, so that unnoted natural infection was not present, infection was given by miracidia from eggs whose species was certain, and the cercariae coming from the molluscs gave the infection to clean animals, as was made clear when worms of full development were seen in the veins.

THE GENUS SCHISTOSOMA⁴ IN MAN.

In addition to the three blood flukes of which man is the optimum host (*S. haematobium*, *S. japonicum* and *S. mansoni*) man has been said to be a harbourer of others; a decision has to be made on this point before going into the question of carriage. In some cases this statement has been based on the size and outline of the egg; then again the morphology of cercariae which have come out of a mollusc has been used to put that animal among the larval hosts of a schistosome of man. Are these beliefs true?

A. The egg in the diagnosis of the species of man's schistosomes.

The size of the egg.—It was noted by CORT ((1915) 1916, 7, 353) that eggs of the fluke *Pneumonoeces simplex* were very different from one another, the greatest being 33 per cent. longer than the smallest. Again it was noted by VEGLIA and LE ROUX ((1929) 1931, 28, 195) that BERTOLINI, in 1908, gave these mean dimensions (in millimetres) for the eggs of *S. bovis*: in the worm's uterus 0.145 by 0.037, in the wall of the intestine 0.188 by 0.044, and in the faeces 0.230 by 0.056. Measuring is no use as a test for species if facts such as these have not been taken into account.

The outline of the egg.—Now that time has given proof that Sambon was right in making *S. mansoni* into a new species for this reason, other attempts in this direction have been made from time to time.

⁴ The "valid name" of the genus is put by SENN ((1931) 1932, 29, 167) as *Bilharzia* Meckel, 1856, that name being earlier than *Schistosoma* Weinland, *Gynaecophorus* Diesing, 1858, and *Bilharzia* Cobbold, 1859. But by O 77 of the International Commission on Zoological Nomenclature the *Schistosoma* is on the Official List of Generic Names, and it is that name while it is on that list.

THE SCHISTOSOMES NAMED FROM THE EGG.

S. incognitum Chandler, 1926.

CHANDLER ((1926) 1927, 24, 174) made the discovery of schistosome eggs in faeces resting on the earth near Krishnagar, Bengal, India ; this place was used for defaecation by man, and the faeces in question had the look of those of man ; so his opinion was that schistosomiasis of man was present in India, and the species was named by him *S. incognitum*. This place was near to a group of houses of pig-keepers, whose pigs went to it frequently to take as food the faeces of man. Chandler made a like discovery at Kalimpong on the lower slopes of the Himalayas, and in this place, as in the other, pigs were common. The material inside these eggs was without structure. SAUNDERS ((1934) 1935, 32, 247) gave an account of schistosome eggs in pig's faeces, which in his belief were the same as those seen by Chandler. He gave the parasite the name *S. suis*, a synonym if his belief is right. An explanation of the fact that there was no structure in Chandler's eggs may be that while in the parent worm they had got into the alimentary canal of some person or some animal, and their protein structures had undergone digestion before they became part of the faeces.

There is then no good reason for the belief that these eggs came from worms which were parasites in man, and much for the suggestion that they did not.

S. faradjei Walkiers, 1928.

An account came from Faradje, in the Upper Welle, Belgian Congo (WALKIERS, 1928, 25, 945), that in five of a great number of investigations of faeces there were seen eggs with no spine to them. In his discussion of the paper, RHODAIN said that such eggs had been seen in Egypt and the Sudan. Later it was pointed out by VAN DEN BERGHE ((1934) 1935, 32, 242) that even the size of the eggs had not been given by Walkiers. There is no proof at present that the name is that of a separate parasite of man.

S. bovis Sonsino, 1876 and *S. mattheei* Veglia and Le Roux, 1929.

Two questions come up here.

1. *Are S. bovis and S. mattheei different?*—Veglia and Le Roux made *S. mattheei* a separate species by reason of the size and habitats of the worms, and the form of the eggs. But while noting that living worms which are dropped into certain solutions undergo much contraction, they kept their worms in normal salt solution (in which they do not) till death came about, but gave no account of any attempt to see that the size of *S. bovis* as given by other workers and taken as right by themselves was measured in these special conditions. It would be surprising if it had been, so that this support for their suggestion is not good. In the first account of them the eggs of *S. mattheei* were said to be oval or fusiform with a well-marked spine at the end but BLACKIE (1932, 29, 401) when picturing the egg made a selection of one representative of *S. bovis*. As to habitat, Veglia and Le Roux say that "their new species has never been found invading the urino-genital organs nor producing lesions as recorded for *S. bovis* by Sonsino, Khalil and others." But it was pointed out by MACHATTIE, MILLS and CHADWICK ((1933) 1934, 31, 114) that Sonsino made in fact no statement that *S. bovis* was a parasite of the genito-urinary system—it is a parasite of the intestine ; in addition, after looking at 4,000 examples

of *S. bovis*, they came to a decision that the account of *S. mattheei* given by Veglia and Le Roux is that of *S. bovis* as present in Iraq, that in one per cent. of female *S. bovis* are seen some uterine eggs with *S. haematobium* outline among a number with that of *S. bovis*, and that in 0.2 per cent. of female *S. bovis* there are eggs of *S. haematobium* outline only, that *S. mattheei* is a synonym of *S. bovis*, and that "one of the great difficulties in the elucidation of this problem is the desire of workers to create new species on what appears to us to be the most trifling variations—variations which in other members of the animal kingdom would be considered of no significance." How like this view is to that of SANDGROUND (see above p. 2)!

2. *Are these forms, even if separate, parasites of man?*—It was noted by MACHATTIE, MILLS and CHADWICK that though eggs with the outline of those of *S. bovis* have come from man (see CAWSTON (1921) 1922, 19, 204) this has only been so when in addition those of *S. haematobium* were present. Again, these workers have seen such eggs, frequently with development not complete, in "tribal" Arabs in parts of Iraq where there has been no discovery of *S. bovis* after very detailed investigation. In addition they give a microphotograph of a uterus of *S. bovis* in which are two eggs side by side, and partly covering one another, one with the outline of *S. bovis* and the other with that of *S. haematobium*; they have been unable to get infection of man with *S. bovis*, and they make the point that there is no experience of full growth, in an animal, of *S. bovis* from an egg in man's urine which has that special outline. Their view is that when the shell gland is not normal there may come into existence in it some eggs having the outline of those of another species of schistosome, and that *S. bovis* is not a parasite of man. Even so, in view of the general behaviour of parasites in non-optimum host species, there will not be agreement that the last is a statement of a completely unchanging rule. These writers have again and again seen an infection caused in *Bulinus truncatus* by miracidia of *S. bovis*; and in Corsica its larval host is *B. contortus* (BRUMPT (1929) 1930, 27, 465).⁵

S. intercalatum Fisher, 1934.

In giving this name, FISHER ((1934) 1935, 32, 239) had in mind those schistosomes whose eggs have a spine at one end and which are the cause of intestinal symptoms only. That there may sometimes be seen eggs with this outline in the faeces, and eggs with the spine on the side in the urine, is common knowledge; but that end-spined eggs may, in Equatorial Africa only, be limited to the faeces was first pointed out by LEGER (1923, 20, 619). The same experience is that of CHESTERMAN (1923, 20, 939) and of SCHWETZ and BAUMANN ((1930) 1931, 28, 194) round about Stanleyville, Belgian Congo; of CHARLIER and CHARLIER-COLLON from Kisale-Katanga, Belgian Congo; of NESSMANN and TRENSZ (1928, 25, 946) from the Gabon in French Equatorial Africa, which is west of the Belgian Congo; of FRANÇA ((1925) 1928, 25, 456) from Angola and W. Africa, with some support for the view that *Physopsis globosa* is the larval host, though *Planorbis pfeifferi* is very common there; of LEGER (1923, 20, 619) from Senegal; and of LAGRANGE (1920, 16, 135) in a boy who had it seems journeyed across most of Equatorial Africa. FISHER's work was at Yakusa, Stanleyville; worms of full development were not seen, because

⁵ As noted (footnote p. 8) Baylis makes *B. contortus* a synonym of *B. truncatus*, itself a larval host of *S. haematobium*.

autopsies were not possible. As to development of miracidia in molluscs, these words of LEIPER and ATKINSON (1915, 6, 296) used in connexion with miracidia of *S. japonicum* are very important. "The 'blunderbuss' method . . . was again relied on. This is, briefly, to submit all likely hosts to an overwhelming infection. The proper host will show a marked, even fatal, susceptibility. . . . *K. nosophora* showed an extraordinarily marked attraction for the miracidia, as contrasted with the other species." In FISHER's belief a *Physopsis africana* subspecies was the larval host of *S. intercalatum*, but he says nothing of any attraction of miracidia to this mollusc, though he does say that he was unable to get any infection to take place in it. A most important unit in the chain of proof is not there at all. The reasons for FISHER's opinion that this was the line of development were these. From *Phys. africana* came cercariae of "human type" with growth to full development in the mouse (*Mus musculus*); the "length-frequency" curves of the eggs in the uteri of these worms, and their size, outline and "range of variability" in the faeces of *M. musculus* were the same as those in the faeces of man. The position, in fact, is that in no detail of form were the worms in *M. musculus* certainly different from those in man, that when the sizes of eggs were mapped in curves the top of the curve from the eggs of *S. intercalatum* was between the tops of those from the eggs of *S. bovis* and *S. haematobium*, and that parts of the two other curves were covered by its base and that the outlines of the eggs had details of the two species. In other words, one will frequently be unable, by size or outline, to put a given egg into this species or into one of the others. FISHER made this statement, "If we retain our present criteria of species in this genus we must conclude that the schistosome with which we are dealing is a new species." The opinion that the fact of being as little different as this from others is enough for the making of a new species is not the anatomical one of Sandground, or that of the present writer. In the writer's belief, FISHER's opinion is still without proof, and in VAN DEN BERGHE's ((1934) 1935, 32, 242) the division lines between *S. haematobium*, *S. bovis* and *S. intercalatum* are not sharp. It may be noted that *Phys. africana* var. is most frequently seen in "calm, shallow, shady water with decaying vegetation," that eggs are present all the year round and that there is ready carriage of the mollusc by a strong current.

S. spindale Montgomery, 1906.

CAWSTON ((1925) 1926, 23, 246) gave his experience of a boy with a number of schistosome eggs in the urine, most being of *S. haematobium* outline but about 1 in 6 having that of *S. spindale*, "possessing a straight border when viewed from the lateral position, but presenting the appearance of the outline of *S. bovis* when viewed from above." The egg was 0.24 mm. long. If the eggs were those of *S. spindale*, the blood fluke of the Indian cow had got into a South African boy. Another explanation would be a diseased shell gland (see MACHATTIE *et al.* under *S. bovis*). In Bombay the mollusc host is *Planorbis exustus*.

B. The use of the morphology of cercariae for the discovery of the larval hosts of the different species of Schistosomes.

If it were possible to say that any cercaria seen coming from a mollusc was that of a certain species of schistosome, the discovery of

the larval hosts of that species would be simple. Unhappily there is no agreement as to the anatomical details of the cercariae of the schistosomes of man.

For example in *Cercaria haematobia* there have been said to be three "mucin, head, or penetration" glands a side by FAUST ((1920) 1921, 17, 55), BETTENCOURT and DA SILVA ((1922) 1923, 20, 218; 1925, 22, 868; (1928) 1930, 27, 457), CAWSTON ((1922) 1923, 20, 941), and ARCHIBALD and MARSHALL (1933, 30, 674); and five of these glands a side by BLACKLOCK and THOMPSON (1924, 21, 940), VOGEL (1932, 29, 409) and GORDON, DAVEY and PEASTON ((1934) 1935, 32, 237).

For *Cercaria mansoni* the numbers given are five a side by KHALIL ((1922) 1923, 20, 220), VOGEL (1932, 29, 409), ARCHIBALD and MARSHALL ((1932) 1933, 30, 210) and GORDON, DAVEY and PEASTON ((1934) 1935, 32, 237); and six a side by FAUST ((1920) 1921, 17, 55), CAWSTON ((1922) 1923, 20, 941), and FAUST, HOFFMAN and JONES (1934, 31, 776).

For *Cercaria japonica* all workers give five a side; CORT ((1919) 1921, 18, 106), CAWSTON ((1922) 1923, 20, 941), TAKAHASHI (1928, 25, 950), and VOGEL (1932, 29, 409).

Two points are, then, clear. Attempts to say, with our present knowledge, that cercariae coming from a mollusc are those of a certain species of schistosome, and that that mollusc is the larval host of that species, are of no value. Secondly, statements of this sort which have been made have to be put on one side. The decision to which we are forced is that at present only *S. haematobium*, *S. japonicum* and *S. mansoni* do in fact come into the picture of schistosomiasis in man.

THE FAR EAST.

Schistosoma japonicum Katsurada, 1914.

Japan.—In the opinion of LEIPER and ATKINSON (1915, 6, 296) the larval host in Japan was *Katayama nosophora* n. g., n. sp. Robson, 1915,⁶ Robson having named it in an addition to the paper, but saying that the name of the genus might have to be changed, the condition of his material being poor. The steps taken in proof that this mollusc was larval host were not the best, because the animals which were used were not of laboratory growth (with the War work had to be stopped suddenly). But on the other hand the very strong attraction which these animals had for the miracidia was present in no other species which was tested, and the cercariae which come naturally from *K. nosophora* became worms of full development in animals. So the writers were in no doubt that the development of the worm was as they said, and with that view there has been a full agreement.

China.—The work of FAUST and MELENEY ((1924) 1925, 22, 468) was done round the Yangtse River. Near Soochow was seen a mollusc like *K. nosophora*, and when 240 were crushed there came from seven of them fork-tailed cercariae which gave to *M. musculus* infection with *S. japonicum*. For the miracidia these molluscs had a great attraction; 26 of them were still living on the 86th day of the test, 10 had the infection, cercariae from two of them underwent growth in *Mus musculus*, so

⁶ The same molluscs have been given different names by different writers. It seems best to give in the body of this paper the names which were used in the papers themselves and in footnotes those which now seem valid.

that 70 days later this was harbouring worms of full development. Bryant Walker of Detroit put the molluscs in the species *Oncomelania hupensis* Gredler, 1881. About Kashing there were, in thousands, molluscs which Faust and Meleney put in the same species and whose attraction for miracidia was great. About Shaohsing were others put by Nelson Annandale of Calcutta in the species *K. nosophora*; and these writers had the same opinion about those they saw at the mouth of the Upper Pearl River fifteen miles west of Canton, all of them being free from infection.

Korea.—No case of infection had come to the knowledge of KOBAYASHI (1925, 22, 453).

Formosa.—*K. nosophora* is not present (Mendoza-Guazon). *Blanfordia formosana* is the larval host. (BEQUAERT (1934) 1935, 32, 246).

Philippines.—In the view of TUBANGUI ((1932) 1933, 30, 210) the larval host is a mollusc "identified as *Blanfordia quadrasi*⁷ (= *Prososthenia quadrasi* Möllendorf) by Dr. J. Bequaert of Harvard University."

All molluscs of this group are long and narrow and have an operculum. They are not water-livers, but when put in it come up and out of it, and it is while they are so doing that they are attacked by the cercariae swimming in the upper parts. When the top of the earth, to which this journey has taken them, becomes dry, they go down through it to wetter parts, and by doing so and by the shutting of the operculum they may be still living almost three months later COCK ((1919) 1921, 17, 59), though the time was shorter in those in which infection had first taken place. Because they are not true water animals it is not possible to put them to death by any amount of care in chemical treatment of waterways.

MEDITERRANEAN BASIN.

Egypt. *S. haematobium*.—Here LEIPER first gave clear proof (1916, 7, 347 and 8, 509) that *S. haematobium* and *S. mansoni* are separate species, that their carriage is by different molluscs, and that for *S. haematobium* the larval hosts are *Bullinus contortus*⁸ Michaud, 1829,

⁷ SYNONYMY OF THESE MOLLUSCS (see BEQUAERT (1934) 1935, 32, 246). In the view of no authority is *Katayama* now a good name for the genus. *Prososthenia* Neumayr, 1869, was used for fossil amnicolid molluscs from Pliocene beds of S.E. Europe, and Pilsbry's belief is that no Oriental mollusc now living has a place in this genus. *Hemibia* Heude, 1889, was put forward without genotype in place of *Oncomelania* because this name seemed "inappropriate." Under the International Code of Zoological Nomenclature the change of an earlier name for this reason may not be made, so Bequaert made *hupensis* the type species of *Hemibia*, and because it had before this been the type of *Oncomelania*, the name *Hemibia* becomes twice "invalid" as a synonym. *Hypsobia* Heude, 1890, "differs from *Blanfordia* and *Oncomelania* in multidentate marginal teeth of the radula. Quite possibly it is generically distinct, but none of the snails thus far known as hosts of blood-flukes can be referred to it," though the species *nosophora* had in fact been put in this genus. There are two names for the genus, *Blanfordia* and *Oncomelania*, which may possibly be given to this group. Bequaert's view of them is this. "It would seem that the smooth-shelled Oriental Amnicolidae known to act as intermediate hosts of the blood fluke *Schistosoma japonicum* such as *nosophora* Robson, *formosana* Pilsbry and Hirase, and *quadrasi* Möllendorf should be placed in the genus *Blanfordia*. The ribbed-shelled species *hupensis* Gredler may be left in *Oncomelania* if one wishes to retain that name in a generic or sub-generic sense." A medical man has, then, good authority for making use of the name *Blanfordia* for all four species.

B. dybouski Fischer, 1891 and *B. innesi* Bourquignat.⁶ His observation like that of Hamilton Fairley and Bahr (Observations on Egyptian Bilharziasis, Part I. Commonwealth of Australia, Department of Defence) was that the colour of normal *Bulinus* is green-black to brown, but that the apical convolutions, as seen through the shell of molluscs which have the infection are yellow. By LEIPER (1918, 12, 164) the point was made that molluscs were present in the great and small waterways coming from the Nile, and in the small stretches of water named 'birkets' near groups of houses, while HELMY's view ((1933) 1934, 31, 383) is that these molluscs come to Egypt every year at the time of high Nile on the plant *Potamogeton crispus*, from the Sudan and places south of this. In the experience of MANSON-BAHR and Hamilton FAIRLEY (1920, 16, 131) the infection rate of these molluscs in birkets was greatest in December, and in their belief oviposition took place in July and August. For the destruction of molluscs by physical methods LEIPER's reading of the facts (1923, 20, 862) was that in Egypt control of the disease might be got by the use of "rotations" in irrigation, the outcome of which would be the death of *Bullinus*⁶ in great numbers, as the result of drying. But that this is not the necessary outcome is seen from BARLOW's field work (1933, 30, 674); because on drying, *Bulinus* molluscs take up a position with the shell-opening facing down, while their excretion of an epiphragm of slime makes their drying up even more uncertain. In the end, 50 per cent. of them came living through his tests, all of these being then free from infection. In further tests BARLOW (1935, *Amer. Jl. Hyg.* 22, 376) found there was 40 times as much *Bullinus*⁶ infection in September, before the drying, as in January after it. That loss was possibly, as in Cort's experience with *Blanfordia*, caused in part by more ready death of molluscs which had infection, but certainly in part by death of the larval worms in them. It is clear that Leiper's suggestion as to the good "rotations" do in limiting this infection is only made stronger by the knowledge that their effect is in fact greatest on molluscs which have infection or on the parasites in them. As Barlow says, death takes place in mollusc's eggs on drying. Death of cercariae takes place straight away in chlorinated lime, 1 in 30,000, and in a feeble solution of ammonium sulphate $[(\text{NH}_3)_2\text{SO}_4]$ (LEIPER, 1915, 6, 437). CHANDLER's experience having been ((1920) 1922, 19, 209) that after 48 hours in copper sulphate (CuSO_4), 1 in 1,000,000, there was death of eight species of molluscs from six genera, KHALIL ((1927) 1928, 25, 456) made an addition of this salt, for four days and nights without stopping, to the chief stream in the Dakhla Oasis. The outcome was the death of all *Bulinus* molluscs, and no living one was to be seen six months later. The strength at which the solution was kept may be taken as five parts to a million (KHALIL (1929) 1930, 27, 366), and in this second paper this observation had gone on for ten months without the discovery of any living molluscs. This parasite is present, in addition in the Baharia Oasis, but not in those of Siwa or Gara, with

⁶ From the account of BAYLIS ((1931) 1932, 29, 408) the valid generic name is *Bulinus* Müller 1781, not *Bullinus* Oken 1815. He makes *B. contortus*, *B. dybouskii* and *B. innesi* synonyms of *B. truncatus* (Audouin 1826). Khalil in fact comes to the same opinion (Discussion, Azim, 1935, 32, 622) in saying " *Bulinus* snails have been caused to change from one species to another, and to give rise to intermediate species by cross breeding." As sub-genera of *Planorbis* with their species Baylis gives *Planorbis dufourii*, *Planorbula boissyi* and *P. pfeifferi*, and *Planorbina olivaceus*, *P. guadaloupensis*, *P. centimetralis* and *P. antiguensis*.

their strongly salt water (KHALIL (1933) 1934, **31**, 327). In the Nag Hamadi area of Quena Province (Upper Egypt), only urinary infection seems to be present, with *Bulinus*⁶ in numbers but no *Planorbis*. In Alexandria the two infections and the two genera of molluscs are present (ABAZA (1929) 1930, **27**, 437).

S. mansoni.—LEIPER gave proof (1916, **8**, 509) that the larval host of *S. mansoni* was *Planorbis boissyi* Potiez and Michaud, 1838, *P. laurenti* Bourquignat from Kake Timsah and the wet lands near Ismalia being seemingly a synonym. It is present in small waterways, drains and wet lands. In BARLOW's work (1933, **30**, 674) 84 per cent. of *P. boissyi* were still living after drying for 30 days, and this they did by going back into the shell where they were shut in by an epiphragm of slime; and in his second paper it is noted that infection in them was 20 times as great before drying in "rotations" as after. But here, again, death of eggs took place quickly on drying (KHALIL, 1922, **19**, 649). In Rodah Island, opposite Cairo, there is no *Planorbis* or *S. mansoni* (EL BATASH, 1929, **26**, 971).

Palestine.—*B. contortus* and *S. haematobium* were first noted in this Bulletin in 1918 at Mulebbis, a Jewish colony near Jaffa, in "cisterns and a deep well" (SEARLE (1920) 1921, **17**, 55), while BUXTON and KRIKORIAN ((1922) 1923, **20**, 212) got cercariae from 6 of 64 of these molluscs there. FELIX (1925, **22**, 464) said that there was infection in this place long before the War and made the discovery that 4.3 per cent. of 1,256 boys and girls certainly had the infection. In 2,400 faeces, *S. mansoni* eggs were present in two cases which had possibly come from some other place, because *Planorbis boissyi* had not so far been seen in Palestine; discovery of two such infections was made in the Tel-Aviv laboratory; the persons came from Yemen, Arabia; and this statement is made—"There is no authentic case of intestinal schistosomiasis having been contracted in Palestine" (1932, **29**, Suppl. 68*). On the other hand, *S. mansoni* was seen in two men in Australia, about whom the belief was that they had got it near Jaffa (FAIRLEY and FAIRLEY (1929) 1930, **27**, 454).

Syria.—There is a first record of *S. haematobium* in the State of Damascus. POMMÉ and SABAGH ((1922) 1923, **20**, 213).

Cyprus.—Infection with *S. haematobium* has been seen for years in Syrianokhori and *B. contortus* is present (1932, **29**, Suppl., 73*). LEIPER had made the observation earlier that the distributions of the mollusc and the infection were the same (1928, **25**, 948). It has got as far as Morphou (1933, **30**, Suppl., 112*) but no further (1934, **31**, Suppl., 99*).

Corsica.—*B. contortus* is present (BRUMPT and WERBLUNSKY, 1928, **25**, 458) and its infection by *S. haematobium* has been effected in the laboratory; and in over 6 per cent. of Senegalese there and in the South of France the infection is present (BERNARD, 1928, **25**, 946). No later statement has come to light, though BRUMPT⁹ (in France) has readily given this infection to the hedgehog (*Erinaceus europaeus*).

Portugal.—The discovery of endemic infection with *S. haematobium* in Algarve was made by BETTENCOURT, BORGES and DE SEABRA ((1921) 1922, **19**, 206). Their belief that the larval host was *Planorbis metidjensis* was based on their getting from them fork-tailed cercariae

⁹ *Ann. Parasit. hum. et comp.* 1930, **8**, 17-50.

very like, if not the same in structure as, those of *S. haematobium*. FRANÇA and DE MELLO ((1921) 1923, 20, 216) gave support to this in their statement that this mollusc has a marked attraction for cercariae, and BETTENCOURT and BORGES gave proof by the infection of mice (*Mus musculus*), with discovery three months later of *S. haematobium* in the portal vein system ((1922) 1923, 20, 218). BETTENCOURT and FIGUEIRA (1923, 20, 621) give an account of schistosomiasis at Alportel, Algarve, with *Plan. dufourii* present in the water. This in Pallary's view is the same mollusc as *P. metidjensis*, but in FRANÇA's ((1922) 1923, 20, 621) the two are somewhat different.

Morocco.—BRUMPT ((1922) 1923, 20, 213) makes comparison between Marrakesh where *B. contortus* is very common and bilharziasis is not common, and Gafsa in Tunis where the conditions are the opposite; but in the experience of CARROSSE ((1930) 1931, 28, 188) furcocercariae came out of 5 or 6 per cent. of *B. contortus* in Marakesh; but not out of *P. metidjensis*, of which there are quite a number. In Tangier, there are *B. contortus* and *P. dufourii* but no schistosomiasis (CHARRIER (1923) 1924, 21, 198). The infection is present at Erfoud (VIALATTE (1932) 1933, 30, 209).

Algeria.—The number of *Bulinus* molluscs is becoming less, acid waters are not harbourers of them, and they are not present in the newly-formed En Naro Marsh (PALLARY (1934), 1935 32, 243). The great size of Lake Onbeira makes treatment to get it clear of molluscs impossible (GAUTHIER (1934) 1935, 32, 243). The only centre of *S. haematobium* infection now is the Oasis of Djanet near Tripoli, 24° N., where it is present in *B. contortus*, *B. dybowskii*, *B. brocchii* and *B. innesi* (see further RAYNAUD (1926) 1927, 24, 515).

Tunis.—The distribution of *Bulinus* is wide, and that of *B. contortus*, *B. brocchii* and *B. dybowskii* is the same as that of *S. haematobium*. *Planorbis philippii subangulatus* is limited to the country between 37°21' N. and 36°33' N. *S. mansoni* has not been seen (ANDERSON (1922) 1923, 20, 619). In the warm springs of Gafsa there are no larval schistosome hosts; the temperature above which they are not present is 28°C. (GOBERT (1934) 1935, 32, 243). *B. brocchii* in "irrigation" canals is probably the wrong-doer (LANGERON, 1924, 21, 544). A variety of this species was given infection with *S. haematobium*; the death of all molluscs took place, but sporocysts were present in 1 of 20 (ANDERSON and DE LAGOANÈRE, 1927, 24, 515).

Tripoli and Cyrenaica.—In the tableland 620 metres higher than the sea there is no schistosomiasis, and nowhere is there *S. mansoni*. *Planorbis atticus* is present. Near Derna *Bulinus* is common and two cases of *S. haematobium* were seen by PATANÉ ((1924) 1925, 22, 464); but the infection is endemic (ZAVATTARI, 1932, 29, 409), 1.4 per cent. of 606 young persons being the measure of its amount (VIGLIETTA (1934) 1935, 32, 243). The belief of RIZZO (1927, 24, 987) was that he had seen the first case of *S. mansoni* infection got in the country. There is a small endemic area of urinary schistosomiasis in Tauorga near Misurata but the only mollusc seen was *Planorbis boissyi libica*; no proof of any connexion between the two was attempted (PENSO, 1934, 31, 383). In Fezzan *S. haematobium* was seen in from 60 to 80 per cent. of boys in some places, but its distribution and that of *Bulinus* seem to be unequal (ZAVATTARI, 1934, 31, 773).

THE REST OF AFRICA.

The Sudan.—Before the start of a watering system in the Gezira Province in 1925, made possible by the building of the Sennar Dam across the Blue Nile, there was almost no infection with *S. haematobium* (HUMPHREYS (1932) 1933, 30, 207). In two years *Bulinus* species, named as being almost all *B. truncatus* with some *B. forskali*, were present in all waterways of the system, and in three years *Planorbis* species in addition (*P. alexandrinus*¹⁰ and *P. pfeifferi*); after the drying of the waterways and the treatment, with a carbolic acid on the market under the name "sizolin," of the hollows which did not get dry, no living molluscs were seen, and the infection rate became a quarter to a sixth of what it had been. In the White Nile Province infection is by *S. mansoni* ((1931) 1933, 30, Suppl., 99*). The molluscs are named by ARCHIBALD ((1933) 1934, 31, 112) as being *B. truncatus* (covering *B. contortus*, *B. dybowskii* and *B. innesi*) and *Planorbis boissyi*, *P. pfeifferi*, *P. alexandrinus* and *P. herbeni*¹¹, and he makes the statement that they are "capable of aestivation in the subsoil for 3 to 4 months and so represent the seed stock of the following rainy season." Again ARCHIBALD's statement is ((1933) 1934, 31, 114) that fruit of the tree *Balanites aegyptiaca* by reason of a saponin is the cause of the quick death of all molluscs when 35 berries are put in 30 litres of water.

Eritrea, Ethiopia, French Somaliland and British Somaliland.—No accounts have come to light.

Italian Somaliland.—There is infection with *S. haematobium* in 30 per cent. of persons who have been there from birth. An *Ampullaria*, but no *Bulinus*, species was seen (VENERONI (1926) 1927, 24, 515).

Uganda.—The only public notes seem to be those in the Government Medical and Sanitary Reports. It seems that there is knowledge of schistosomiasis only near the Albert Nile, and no knowledge of the larval hosts of the worms.

Kenya and Tanganyika.—*S. haematobium* and *S. mansoni* are present. No statement as to larval hosts has come to light.

Zanzibar.—The suggestion of CAWSTON (1927, 24, 987) is that *Physopsis ovoidea*, limited to Zanzibar, may be a species and not a variety of *Ph. africana*,¹² and may be the larval host here of *S. haematobium*; a suggestion with which MANSFIELD-ADERS ((1929) 1930, 27, 943) is in agreement, but which, it seems, has not been put to the test.

¹⁰ In the opinion of Major Connolly *P. alexandrinus* is a synonym of *P. boissyi*.

¹¹ The valid name is *herbini*, as Connolly has said.

¹² Connolly's view ((1934) 1935, 32, 241), using for the most part his own words, is that between *Physopsis africana* Krauss, 1848 and *Physopsis globosa* Morelet, 1866, the only real difference is that the second has a slight rimation which is only fairly constant. [In other words on the method of grouping used here, the valid name will be *Physopsis africana*.] South of Egypt the oldest name applied to those molluscs of the genus *Planorbis* which are nearly alike is *Pl. pfeifferi* Krauss, 1848. It is seen in the greater part of the continent south of the Kunene and Zambesi rivers, but Connolly has noted typical shells from Northern Rhodesia and Kenya. Other specific names which have been used are *Pl. stanleyi* Smith, 1888 and its synonym, *Pl. bridouxii* Bourguignat; when molluscs from Kaballa were sent to Louis Germain of Paris his view was that "your *Planorbis* from Sierra Leone is evidently near to *pfeifferi* Krs., but still more so to the forms from L. Chad of *bridouxii* Bqt., and it seems more suitable to classify it as that species." (CONNOLLY (1934) 1935, 32, 241). In other words the expert

Nyasaland.—Judging by attraction of cercariae to molluscs, *Physopsis globosa* is probably the larval host of *S. haematobium* and a *Planorbis* species for *S. mansoni* (CHRISTOPHERSON (1923) 1924, 21, 198). The only mollusc from which fork-tailed cercariae came was *Melanoides tuberculata*. It is not seen from July to September, and at that time no new cases of infection with one or the other of these parasites came to hand, so that the suggestion is made that it is larval host for the two schistosome species (GOPSILL (1930) 1931, 28, 188).

Portuguese East Africa.—The two worms are present (PERRET-GENTIL, 1933, 30, 675).

Madagascar.—For long only *S. mansoni* has been noted (GIRARD (1920) 1922, 19, 200), infection being greatest in the South Plateau (55.3 per cent. in 170 examples of faeces, RAYNAL (1929) 1930, 27, 463), but LUTROT (1935, 32, 624) has now seen the eggs of *S. haematobium* in Tsianipiha and Anjijobe in those who have not been away from the island. No work seems to have been done on molluscs.

Mauritius.—*S. haematobium* is present. The larval host has at last been made clear by ADAMS (1934, 31, 774) in *Bulinus forskali* which has a great attraction for miracidia and readily undergoes infection. Animal tests were undertaken but without development of worms, possibly, the suggestion was, because the numbers of cercariae used were small (A. R. D. ADAMS, 1935, *Ann. Rep. Bacteriol. Lab. Mauritius* for 1934)—a right suggestion, because when ADAMS put *M. musculus*, for 24 hours in all, in the way of infection by all cercariae coming freely from about 24 *B. forskali*, it got a strong infection with worms which had in all chief details the structure of *S. haematobium* (*Annals Trop. Med. & Parasit.*, 1935, 29, 255).

Swaziland.—*S. haematobium* is present at levels under 3,000 ft. (1931, 30, Suppl., 88*); and cases of persons coming to hospital are increasing ((1932) 1934, 31, Suppl. 76*).

Natal.—The knowledge got from the reading of the papers on this question is not equal to their size and number. Some decisions are based on belief that the species of schistosome may be named from the structure of the cercaria. In *Physopsis africana*, from water which had been noted as having the infections, sporocysts were seen which had fork-tailed cercariae inside them (CAWSTON (1915) 1916, 7, 348). An account of the growth of the worm to full development in test animals of cercariae from *Ph. africana* is given by PORTER (1920, 16, 131). *Ph. africana* of laboratory growth was given infection with miracidia of *S. haematobium*; 35 days later cercariae came away (CAWSTON (1922) 1923, 20, 216), but *Limnaea natalensis* gave no sign of infection; and he has made the discovery that the molluscs are undamaged by drying long enough to be sent by post (1927, 24, 986) and may still be living after thirty days in earth (1929, 26, 790).

Cape Province, Orange Free State Province, Transvaal, Basutoland and S.W. Africa.—No paper upon schistosomiasis has been come across in this *Bulletin*.

was not ready to put the examples certainly in one species or the other; Connolly's suggestion [private letter] about near species is that while it would be conchologically incorrect to refer to either of them under the name of the other, the use by medical men of such words as "*Planorbis* of the *pfeifferi* group (or type)" and "*Physopsis* of the *africana* group (or type)" would give to other medical workers enough detailed knowledge for their purpose, a suggestion which seems to the reviewer to be wise and to the point. For this and other suggestions on this subject the writer is very much in Major Connolly's debt.

Bechuanaland.—*S. haematobium* is present (1933, 30, Suppl., 86*).

Southern Rhodesia.—In the work of BLACKIE (1932, 29, 401) cercariae were got from natural infections of *Phys. globosa* but infection of *Planorbis pfeifferi* was produced in the laboratory from miracidia of *S. mansoni*. These cercariae came to full growth in guineapig (*Holochilomys brasiliensis*) and rabbit (*Lepus cuniculus*), and in this way proof was got that here the larval host of *S. mansoni* is *Planorbis pfeifferi* and of *S. haematobium* is *Physopsis globosa*. In the small grey monkey of the country, *Cercopithecus pygerythrus*, *S. mansoni* went to full growth, so this may be a natural host as *C. sabaues* is on St. Kitts. *Plan. pfeifferi* has a narrower distribution in the Colony than has *Phys. globosa*.

Northern Rhodesia.—"Schistosomiasis is reported from most stations; the subject calls for investigation at an early date." (1934, 31, Suppl., 71.*)

Angola.—No paper has been seen.

Belgian Congo.—The two infections are present in addition to that noted under *S. intercalatum*, but outside this there seems to have been no work on molluscs as hosts other than a list of them by VAN DEN BERGHE ((1934) 1935, 32, 242) in which are *Planorbis adowensis* and *sudanicus*, *Physopsis africana* and *Bulinus forskali*.

French Equatorial Africa.—The chief seat is at Tchad (LEFROU (1923) 1926, 23, 747). At Dakar 6 of 19 cases of intestinal schistosomiasis were caused by *S. haematobium* and 1 of 140 of vesical infection by *S. mansoni*; there are *B. contortus* and *B. strigosus* at Medina (Upper Senegal) and no *Planorbis boissyi* but 16 other species (LEGER (1923) 1927, 24, 514).

Nigeria.—The two infections are present. *Physopsis globosa* is frequent in small stretches of water in Kano (GORDON, 1932, 29, 409). At Kagoro infection took place by *S. mansoni* of Europeans after bathing in water having a connexion with a place where there were *Plan. pfeifferi* and *Plan. stanleyi*, some of the molluscs having infection with fork-tailed cercariae (TAYLOR, 1932, 29, 742).

Gold Coast.—The two infections are present but do not seem to have been noted in print outside government papers.

Liberia and French Guinea.—Infection is with *S. mansoni*, and from *Planorbis choanomphalus* came fork-tailed cercariae which went into the skin of man (MAASS and VOGEL (1930) 1931, 28, 194). But *Plan. pfeifferi* has a strong attraction for miracidia of *S. mansoni*, and the cercariae from it have come to full development in monkeys (VOGEL, 1932, 29, 409); his suggestion is that, as in Sierra Leone, *Physopsis globosa* may here be the larval host of *S. haematobium*.

Sierra Leone.—The work of GORDON, DAVEY and PEASTON ((1934) 1935, 32, 237) has made it clear, on the lines which have been noted earlier (p. 2) as necessary for safe decisions, that *S. mansoni* has here *Plan. pfeifferi* as larval host, and *S. haematobium* has *Phys. globosa*.

Senegal.—The two species of schistosomes are present. The list of molluscs given has in it *Bulinus contortus* and *B. strigosus* and though there is no *Planorbis boissyi* there are said to be sixteen other species, among them *P. bridouxii* and *P. salinarum* (LEGER, 1923, 20, 619). LEFROU ((1933) 1934, 31, 115) gives in addition *B. dybowskii*.

THE REST OF ASIA.

Arabia.—In the laboratory at Aden was seen one case of *S. haematobium* and one of *S. mansoni* in men who had not been across the sea at all (GREVAL, 1923, 20, 621). There is knowledge that *S. mansoni* is present at Yemen (MALCHI (1924) 1925, 22, 866).

Damascus.—*S. haematobium* was seen in a Syrian who had never been away from Damascus (POMME and ABDEL KADER-SABBACH (1923) 1924, 21, 205).

Iraq.—It was hard for BOULENGER ((1919) 1920, 16, 134) to put into agreement the great number of cases of infection with *S. haematobium* in the Arabs with the small number of *Bulinus* molluscs. Clearing water plants and putting a stop to watering of the land for 14 days every three months made their numbers less (HALL (1925) 1926, 23, 244). A detailed account of their morphology was given by ANNANDALE (1919, 13, 200).

India.—A footnote by Leiper, at the end of an outline account of a discussion on the reason why this infection is not got in India is to the point: "The absence of the mollusc genus *Bulinus* from the Indian fauna may indicate an alternative explanation to that put forward in this paper." (MILTON, 1919, 14, 141.)

Cochin China.—In the same way men harbouring *S. haematobium* and *S. mansoni* have come freely into Cochin China but without handing on the infection to others.

AMERICA.

The only schistosome of man which has larval hosts in America is *S. mansoni*.

Venezuela.—The work of ITURBE and GONZÁLEZ made it clear in 1917 (10, 114) that *Planorbis guadaloupensis*¹³ is the larval host, because among all the molluscs which were tested it was in this one only that infection was readily got, it took place in almost every mollusc of this species which was used by them, it went on to the stage of cercariae, and the cercariae came to full development in *Mus musculus*. Quiet river water and canals are its normal habitats (ITURBE (1924) 1925, 22, 467). In an outskirt of Caracas there was still infection of 25 per cent. of these molluscs nine years later (HILL and TEJERA (1933) 1934, 31, 380).

Porto Rico.—FAUST, HOFFMAN and JONES (1934, 31, 776) went over the same field as Iturbe and González, with like results, the snail being *Planorbis guadaloupensis* and growth to the stage of full development taking place in "rats." In canals about Guayama 8 per cent. of these molluscs had a natural infection.

St. Kitts.—CAMERON made the important discovery that African monkeys on this island had infection with *S. mansoni* ((1928) 1929,

¹³ In the abstract of a paper by FAUST & HOFFMAN ((1934) 1935, 32, 245) are these words: "*Planorbis sensu stricto* applies only to European species, the American forms belong to *Helisoma* Swainson, 1840. But *Helisoma* has been divided into several subgenera, of which *Planorbina* Dall, 1905, contained *glabratus*. But the subgeneric name *Planorbina* was preoccupied by Haldeman in 1842 so cannot be used for this group, and was therefore superseded by Pilsbry in 1934 by the name *Australorbis* which is held to require full generic rank, with *glabratus* as type." The name *glabratus* Say, 1818 has priority of *guadaloupensis* Sowerby, 1821, for the species.

26, 533) and gave a demonstration that the larval host was *Planorbis guadaloupensis* ((1929) 1930, 27, 267).

French St. Martin.—In the opinion of JONES ((1923) 1924, 21, 201) the larval host seems to be *Planorbis antiguensis*.

U.S.A.—The case noted in Illinois (SULLIVAN, 1932, 29, 741) with a number of worms of full development in the urine may not rightly be listed as one of schistosomiasis.

Cuba.—There is no *S. mansoni* infection and no *Plan. guadaloupensis* (HOFFMANN (1922) 1923, 20, 219).

Central America.—There is no schistosomiasis (RISQUEZ (1921) 1922, 19, 201).

Dutch Guiana.—The work of Leiper and those working with him made it clear that *S. mansoni* was endemic in Paramaribo that *Planorbis olivaceus* was present in rice fields on its outskirts and in roadside waterways in it, 5 per cent. of them in the town having infection (KHALIL and LEE (1921) 1923, 20, 940).

French Guiana.—LABERNADIE and MARNEFFE ((1929) 1930, 27, 441) saw eggs of *S. mansoni* in 65 of thousands of samples of faeces at Cayenne, and all of these persons had been outside the country.

Brazil.—In tests by LUTZ, *Planorbis olivaceus* Spix gave full development, to the stage of cercaria, of the miracidium of *S. mansoni*, while in *Plan. ferrugineus* Spix and *Plan. tenagophilus* d'Orb infection took place but development did not go as far as the cercaria ((1916) 1917, 9, 271); in animals cercariae went to full development in the mesenteric veins in five to six weeks. *P. olivaceus* has not been seen south of Bahia ((1917) 1918, 11, 78). In the view of CHRISTOPHERSON (1923, 20, 941) the molluscs sent him by Lutz were *Planorbis olivaceus* and *Plan. centimetralis* Lutz, 1918,¹⁴ the second from North Brazil. In Sergipe *Plan. centimetralis* was, in the belief of CARDOSO ((1923) 1924, 21, 199), the common larval host. In places in Parahyba this mollusc is present in numbers and almost all of them have the infection. This is quickly becoming wider, and the molluscs in question are *Plan. olivaceus*, *P. guadaloupensis* and *P. centimetralis*. In tests by Lutz this last is certainly a larval host, because there has been development of cercariae and from these infection of white mice by worms of full development (LUTZ, 1934, 31, 779). It may be overlooked among the much greater *P. olivaceus*.

AUSTRALIA.

FAIRLEY and FAIRLEY ((1929) 1930, 27, 454) make note that NELSON ((1912) 1913, 1, 426) had seen three cases in Western Australia but that Cherry had been able to give infection to no molluscs of the genera *Bullinus*,⁶ *Ancylus* and *Planorbis*. There is no need to put in the list of infections the case of HOLLAND and WOODWARD ((1924) 1925, 22, 465) of a boy of three who had been in the same house in New South Wales from birth and whose urine had eggs, "twice or three times as large as the typical ones, spherical, the clear capsule much thicker, the spine missing."

¹⁴ The specific name as it is used by some writers is *centimetralis*, by others *centrimetralis*. As given to it by LUTZ ((1918) 1919, 14, 142) it was *centrimetralis*, equally in the Portuguese and English accounts, and that is the valid name.

KALA AZAR.

FORKNER (C. E.) & ZIA (Lily S.). An Outline of the Development of the Theories for the Transmission of Leishmaniasis together with Further Evidence to support a Theory of Direct Transmission of Kala-Azar through the Agency of Oral and Nasal Secretions.—*Far. Eastern Assoc. Trop. Med. Trans. Ninth Congress, Nanking, China, 1934.* Vol. 1. pp. 633–654. With 4 figs. on 1 plate. [129 refs.]

NAPIER (L. Everard). The Transmission of Kala-Azar in India.—*Ibid.* pp. 657–665.

ZIA (Lily S.) & FORKNER (Claude E.). Acute Agranulocytosis—a Previously Unrecognized and Important Complication of Kala-Azar.—*Ibid.* pp. 667–678. With 7 figs. [16 refs.]

ANDREWS (Mary N.). A Case of Canine Kala-Azar occurring in China.—*Ibid.* pp. 679–681. With 2 plates.

The first paper in this series is by FORKNER and ZIA and discusses the possibility of direct transmission of kala azar through the agency of oral and nasal secretions in which they have demonstrated viable leishmania. It is very largely the same as other papers on the same subject by these authors, reviewed in this *Bulletin*, 1934, Vol. 31, p. 656 and 1935, Vol. 32, p. 479. The second paper is by NAPIER, on the subject of transmission of kala azar in India by *Phlebotomus argentipes*. It is in many ways a reply to the first paper and embraces views expressed by the author in a paper reviewed in this *Bulletin*, 1932, Vol. 29, p. 106. The third paper, by ZIA and FORKNER, describes acute agranulocytosis in kala azar, a subject already dealt with by them (this *Bulletin*, 1935, Vol. 32, p. 482). The fourth paper, by Mary N. ANDREWS, records the case of a dog which had a generalized leishmania infection. The dog in question was born in Mukden in 1926 and was brought to Shanghai in 1929, when it appeared to be in good health. In 1931 general enlargement of the glands commenced. In May 1932 the dog was losing ground and was destroyed in July of that year. The only tissues kept for examination were the glands and spleen and in sections of these heavy leishmania infections were found. It seems probable that the infection was contracted in Mukden, an endemic centre of kala azar, rather than in Shanghai where the disease is not known to occur. This is the first record of kala azar in a dog in China.

C. M. Wenyon.

SHORTT (H. E.) & SWAMINATH (C. S.). The Presence of *Leishmania donovani* in the Nasal Secretion of Cases of Indian Kala-Azar.—*Indian Jl. Med. Res.* 1935. Oct. Vol. 23. No. 2. pp. 437–439. With 2 figs. on 1 plate.

In view of the work of FORKNER and ZIA on cases of kala azar in North China and their discovery that leishmania occur quite commonly in the nasal secretions the authors have examined from this point of view four cases of this disease in India. In two of these leishmania were found in smears of the nasal mucus which had been taken on the type of probe used for routine nose and throat examinations. The parasites were quite normal in appearance, so that it is probable they are viable, as has been proved in the Chinese cases.

C. M. W.

GRITTI (Paolo). Sulla presenza di leishmanie nel rinofaringe di bambini affetti da leishmaniosi. [*Leishmania in the Nasopharynx of Children suffering from Kala Azar.*—*Pediatrics*. 1935. May 1. Vol. 43. No. 5. pp. 562-567. With 2 figs. English summary (5 lines).

In the adenoid tissue of the rhino-pharyngeal region of three cases of kala azar the author has demonstrated the presence of leishmania. The conclusion is that the lymphoid tissues of Waldeyer's ring form a suitable medium for the development of the parasites of kala azar.

C. M. W.

SHORTT (H. E.), SINTON (J. A.) & SWAMINATH (C. S.). **The Probable Vector of Oriental Sore in the Punjab.**—*Indian J. Med. Res.* 1935. July. Vol. 23. No. 1. pp. 271-278. With 1 fig.

That *Phlebotomus sergenti* was the probable vector of oriental sore in India was pointed out by SINTON (1922-27) in his studies on the distribution of sandflies. Later ADLER and THEODOR studied this sandfly in Baghdad and obtained development of *Leishmania tropica* in its alimentary canal. In one case a volunteer inoculated with flagellates from an experimentally infected sandfly developed an oriental sore. Out of 683 *P. sergenti* dissected in Baghdad two were found naturally infected. As many of these feeding and inoculation experiments had been carried out with caught flies the author decided to repeat the work with laboratory bred flies. This he has successfully done and has shown that *Leishmania tropica* develops into flagellates in the alimentary tract of these sandflies after feeding on oriental sores. A *Macacus rhesus* inoculated into the skin by scarification with flagellates from a sandfly fed 5 days before on a sore developed a lesion in which leishmania were demonstrated. It would appear that the Punjab strain of *L. tropica* develops in *P. sergenti* in a manner indicating a definite host-parasite relationship.

C. M. W.

KHALIL Bey (M.) [Opened by]. **A Discussion on Leishmaniasis in Egypt.**—*Jl. Egyptian Med. Assoc.* 1935. Apr. Vol. 18. No. 4. pp. 203-206.

The discussion related to the endemic focus of oriental sore which had recently come to light near Zagazig to the East of the Nile Delta (this *Bulletin*, 1935, Vol. 32, pp. 81 & 89).

C. M. W.

PAPANTONAKIS (Evangelos). **Observations on Leishmaniasis in the District of Canea (Crete).**—*Ann. Trop. Med. & Parasit.* 1935. July 17. Vol. 29. No. 2. pp. 191-197. With 3 graphs & 1 plan.

The paper describes kala azar and oriental sore in the district of Canea in Crete, the first case from which was described by ARCHER in a British soldier in 1907. It is probable that at least 50 cases of kala azar occur in the district each year and these have the usual characters of the Mediterranean disease. Two centres, Hagios Ioannis and Koun-Kapi, which are relatively newly-built quarters 1 kilometre and 350 metres respectively from the old town, are the endemic foci of kala azar, which is quite absent from the old town. On the other

hand the old town is the endemic focus of oriental sore. This difference in distribution of the two diseases corresponds with the distribution of the sandflies responsible for transmission. C. M. W.

BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1935. Mar. Vol. 27. No. 3. pp. 519-549. La leishmaniose viscérale dans les pays méditerranéens. [**Kala Azar in the Mediterranean Littoral and Elsewhere.**] I. La leishmaniose viscérale dans les colonies britanniques du bassin méditerranéen [STANTON (A. Thomas) pp. 519-524]. II. La leishmaniose en Italie [LUTRARIO (A.) pp. 525-532]. III. La leishmaniose viscérale au Maroc [GAUD (M.) pp. 533-535]. IV. La leishmaniose au Portugal [JORGE (Ricardo) pp. 536-543. With 2 maps]. V. La leishmaniose viscérale humaine en Tunisie [ANDERSON (Ch.) pp. 544-547. With 1 map]. VI. La leishmaniose canine en Egypte [CARPANO (M.) pp. 548-549].

COPANARIS (Ph.). La leishmaniose viscérale en Grèce.—*Bull. Office Internat. d'Hyg. Publique*. 1935. Aug. Vol. 27. No. 8. pp. 1570-1574.

These papers are answers to the questionnaire sent out to the countries mentioned in the title and are a continuation of the series noted in this *Bulletin*, 1935, Vol. 32, p. 81. Little new information beyond that already noticed in published papers reviewed in this *Bulletin* is given. C. M. W.

MARCHESI (F.), CRAINZ (F.) & SCAPATICCI (R.). **Investigations on the Seasonal Variations of Canine Leishmaniasis in Rome.**—*Jl. Trop. Med. & Hyg.* 1935. Sept. 16. Vol. 38. No. 18. pp. 226-229. With 1 chart. [43 refs.]

The authors discuss the problem of leishmaniasis in Rome, an investigation into which has been in progress. It appears that both the visceral and the cutaneous diseases may be contracted in this city, while one case of the muco-cutaneous form has been recorded. The reservoir of the visceral disease appears to be the dog, for the examination of 861 destroyed dogs during 1934 revealed leishmania infection in 18. During the winter months, December to March, no infections were encountered, but from April to November there was a fairly steady rise till in the last month 6.2 per cent. of 80 dogs examined were infected. C. M. W.

GUERRICCHIO (A.). Osservazioni clinico-statistiche sulla leishmaniosi viscerale e cutanea in Lucania. [**Kala Azar and Oriental Sore in Lucania (Southern Italy).**]—*Riforma Med.* 1935. Apr. 27. Vol. 51. No. 17. pp. 626-630. With 10 figs. [16 refs.]

The paper gives an account of kala azar (12 cases) and oriental sore (24 cases) which the author has studied in the province of Matera in Southern Italy. C. M. W.

SAVAGNONE (Lucio). Sul kala-azar viscerale degli adulti. [**Adult Kala Azar (in Sicily).**]—*Polichnico. Sez. Prat.* 1935. Aug. 5. Vol. 42. No. 31. pp. 1527-1537.

A description, accompanied by a lengthy discussion, of two cases of kala azar in adults (22 and 37 years of age) from the province of Palermo in Sicily. Both were cured by appropriate treatment. C. M. W.

NAJERA ANGULO (Luis). Las leishmaniosis visceral y cutanea y su importancia en España. [**Leishmania Infection in Spain.**—*Medicina Paises Cálidos*. Madrid. 1935. Sept. Vol. 8. No. 9. pp. 421-444. With 3 figs. (maps). [111 refs.]

In this paper the author has collected all the records that have been made of the existence of kala azar and oriental sore in Spain. Of the former disease there have been over 800 cases, the distribution of which is shown on a map. The distribution of the recorded species of *Phlebotomus* is given on another map, while on a third map the distribution of the disease and the sandflies is compared. As regards the disease itself, it conforms in every way with the well-known Mediterranean type of kala azar, the greatest incidence being in very young children 2-3 years of age. The incidence of the disease in Spain is compared with the records from a number of other countries where figures are available. Oriental sore is less common than kala azar, DE BUEN in 1934 having found records of 27 cases. The author considers that kala azar should be made a notifiable disease in Spain.

C. M. W.

DE BUEN (Sadi). Nota sobre un caso de kala-azar infantil en la provincia de Huesca.—*Medicina Paises Cálidos*. Madrid. 1935. Oct. Vol. 8. No. 10. p. 483.

MOLINA (Constantino) & MIGUEL (Antonio S.). Un caso de boton de Oriente en la provincia de Murcia (Abaran).—*Medicina Paises Cálidos*. Madrid. 1935. Oct. Vol. 8. No. 10. pp. 481-482. With 1 fig.

COELHO (Joao). Premier cas au Portugal de kala-azar chez l'adulte. [**First Case of Kala Azar in an Adult in Portugal.**—*Rev. Méd. et Hyg. Trop.* 1935. May-June. Vol. 27. No. 3. pp. 124-126.

Though infantile kala azar has been known for some time in Portugal the first case in an adult is the one referred to in this paper.

C. M. W.

NATTAN-LARRIER (L.) & GRIMARD (L.). Les chiens de luxe contaminés dans le midi de la France peuvent-ils répandre la leishmaniose en dehors des foyers de la maladie? [**Possibility of Spread of Leishmania Infection by Pet Dogs visiting the South of France.**—*Bull. Soc. Path. Exot.* 1935. Apr. 10. Vol. 28. No. 4. pp. 270-276.

Though it is well known that in kala azar districts in the south of France the street dogs are liable to leishmania infection it is not realized that pet dogs during a visit to these districts may contract infections which are carried to other parts of the country. The author calls attention to a number of such cases he has met with in Paris and he knows that similar ones have been encountered in Biarritz and Bordeaux. The possibility that such dogs may be the cause of human infections outside the known endemic areas of kala azar has to be recognized, for it is conceivable that the distribution of *Phlebotomus perniciosus* in France is more extensive than at present supposed.

C. M. W.

ROSSI (P.). Sur la présence de *Phlebotomus perniciosus* à Mâcon. [*Phlebotomus perniciosus* in Mâcon.]—*Bull. Soc. Path. Exot.* 1935. Apr. 10. Vol. 28. No. 4. pp. 282-284.

The author discusses the distribution of *Phlebotomus perniciosus* in France. Apart from the south of France, where it is well known, it has also been recorded from Dijon and Bron. Its presence at Mâcon is now noted and the author thinks it possible that this sandfly will be found all over France. He draws attention to the danger of the sandfly spreading leishmania infection from infected dogs brought from the south of France. C. M. W.

POTCHECHUJEV (K.). [The Incidence of Canine Leishmaniasis in Ashkhabad.]—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 1-2. [In Russian pp. 112-116.]

The author examined the total canine population of Ashkhabad (Turkestan), numbering 3,385, out of which 97 (2.86 per cent.) proved to be infected with cutaneous leishmaniasis. C. A. Hoare.

DONATIEN (A.) & LESTOQUARD (F.). Observations et réflexions sur la leishmaniose générale du chien. [Canine Leishmaniasis.]—*Arch. Inst. Pasteur d'Algérie.* 1935. Sept. Vol. 13. No. 3. pp. 320-338.

The authors have kept under observation in Algiers 21 dogs which had naturally-acquired kala azar. The result has been to show that for periods of several months dogs known to be infected may show no symptoms whatever of the disease, which is generally recognized by three signs—emaciation, keratitis and dermal lesions. Furthermore, leishmania were demonstrated in the skin of all the dogs even when the skin appeared to be perfectly normal. It is evident that smears made from the dermis can be used for diagnostic purposes, as has been proved by the finding of leishmania in 3 of 24 such smears sent to the laboratory by outside workers. C. M. W.

DONATIEN (A.) & LESTOQUARD (F.). Notes sur la leishmaniose viscérale canine. [Kala Azar in Dogs.]—*Bull. Soc. Path. Exot.* 1935. June 12. Vol. 28. No. 6. pp. 426-431.

With regard to the diagnosis of kala azar in dogs the authors call attention to the regular occurrence of leishmania in the skin of infected animals, even those which have healthy skins and show no clinical signs of their infection. As a rule the parasites are not numerous in the smears from the skin but they are there in proportion to the number of cells present, so much so that it would appear that the cutaneous infection is actually as intense as or even more so than that of internal organs. The authors emphasize the value of the formol-gel and antimony tests in this disease. In the former test they consider that two distinct reactions occur, the one being a gelification and the other opalescence followed by opacity. It is the second, which may occur with or without gelification, which is of significance from the point of view of diagnosis of leishmania infection. C. M. W.

BENHAMOU (Ed.), FAUGÈRE (R.) & CHOSSAT (F.). Le diagnostic du kala-azar par les frottis dermiques. [**Kala Azar diagnosed by Skin Scrapings.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1935. July 22. 51st Year. 3rd Ser. No. 25. pp. 1326–1333.

The two cases of kala azar in children, 1 year and 8 years of age, in Algeria are described because of the interesting discovery of leishmania in films made from the skin. The diagnosis in the younger child was made by spleen puncture. At the same time, by using a vaccinostyle and avoiding haemorrhage, 5 films were made from scrapings of the dermis on the thigh. In the spleen smears, as also in all 5 dermal smears, leishmania were found. The child was treated and received two courses of neostibosan during which clinical recovery was steadily maintained. During this time films were made regularly from the skin of different parts of the body. In all 14 sites were examined and in films from 12 of these leishmania were found. A dog, apparently in good health, which lived in the home of the child was examined by making smears from a piece of skin removed from the ear. In these leishmania were also found. In the case of the second child spleen puncture failed to give a diagnosis, though smears from the skin succeeded. In this case again, after treatment leading to rapid diminution in the volume of the liver and spleen and general improvement, leishmania were still recovered from the skin on a number of occasions. The importance of the presence of parasites in the skin from the point of view of the spread of the disease by sandflies is commented upon. C. M. W.

DOSTROVSKY (A.). **The Diagnostic Value of Leishmania Vaccine.**—*Ann. Trop. Med. & Parasit.* 1935. July 17. Vol. 29. No. 2. pp. 123–128. With 1 plate.

A vaccine consisting of a suspension of 1,000,000 culture forms of *Leishmania tropica* in 1 cc. of phenol saline solution was prepared and employed in a skin test in which 0.1 cc. was injected intradermally, a simple phenol saline injection being given as control. The injection produced an area of erythema, in the centre of which, in positive cases, an infiltration varying in diameter from 0.5 cm. to over 1.0 cm. occurs. Seventy cases of known infection were tested and a positive result was obtained in 98 per cent. The largest reactions were given by the "tubero-ulcerative" type of sore. Of 70 cases tested as controls there was a positive (+) reaction in 7. It is noted that in old sores leishmania may be difficult to find. In such cases the histological features of excised portions of the lesion may help in diagnosis. It is in these cases that the skin test may be of value. C. M. W.

NATTAN-LARRIER (L.) & GRIMARD (L.). Etude comparative de trois procédés destinés au diagnostic sérologique du kala-azar. [**Serological Diagnosis of Kala Azar.**—*Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 658–665.

The authors have noted that fixation of the complement occurs when serum of a kala azar case is mixed with serum of a rabbit hyperimmunized by the injection of culture forms of *Leishmania donovani*. This phenomenon may be utilized as a test for kala azar by adding progressive dilutions of serum from a hyperimmune animal to a fixed

quantity of the serum to be tested plus complement. After incubation for 1½ hours a haemolytic serum and corpuscles are added to discover whether any free complement is present. If haemolysis occurs the test is negative for leishmania infection. In the authors' hands tested on both human and canine sera the complement fixation test is more certainly diagnostic than either the formol-gel test or the formol-neostibosan test, nevertheless it is their custom to apply all three tests to sera received for diagnostic purposes. C. M. W.

BOGLIOLO (Luigi) & GRECO (Zaira). Studi sulle leishmaniosi. IV. Sopra la specificità ed il valore pratico di alcune reazioni umorali per la diagnosi della leishmaniosi viscerale. [**The Diagnostic Value of Serum Tests in Kala Azar.**—*Ann. di Med. Nav. e Colon.* 1935. May-June. 41st Year. Vol. 1. No. 5-6. pp. 273-285. [43 refs.]

The authors have tested on a number of cases of kala azar and other diseases various serological reactions which are commonly employed to aid in the diagnosis of kala azar. The Brahmachari test, in which distilled water poured on to the surface of serum gives a white ring, they consider of no value whatever. The Gaté and Papacostas (the formol-gel) reaction, though suggestive of kala azar when definitely positive, cannot be regarded as specific. The same is true of Chopra's urea-stibamine test. In the author's opinion it has to be accepted that a diagnosis of kala azar cannot be established by any of these tests.

C. M. W.

GIRAUD (Paul), BERTHIER, CIAUDO & PRALIAUD. Réactions sérologiques de la leishmaniose chez un malade atteint d'endocardite maligne. [**Malignant Endocarditis giving a Formol-Gel Reaction.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1935. May 27. 51st Year. 3rd Ser. No. 17. pp. 863-866.

A case with enlargement of the spleen was found to have a serum which gave a very strongly positive reaction with the formol-gel, the urea-stibamine and the peptonate of iron tests. On this account it was thought to be a case of kala azar. The case was, however, one of malignant endocarditis.

C. M. W.

MARCHESI (Franco) & SCAPATICCI (Riccardo). On Certain Serological Tests used in the Diagnosis of Leishmaniasis in Dogs.—*Jl. Trop. Med. & Hyg.* 1935. Sept. 16. Vol. 38. No. 18. pp. 225-226. [10 refs.]

The Brahmachari test for kala azar consists of the addition of one part of serum to two parts of distilled water. It is positive when a precipitate forms. In the formol-gel test of Napier a complete coagulation occurs in positive cases when a drop of formalin is added to 1 cc. of serum. The authors have applied these tests to 100 dogs, some of which had leishmania infections. The conclusion is that the tests are not sufficiently reliable to justify the abandonment of a search for parasites. When in man it is not possible to undertake an examination for parasites more than one type of serological test should be applied.

C. M. W.

BALASHEVA (M. T.). [The Rieckenberg Reaction in Leishmaniasis. 2nd Communication.]—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 1-2. [In Russian pp. 19-22.]

In a previous investigation in which the Rieckenberg reaction, or adhesion test, was employed for the detection of the incidence of cutaneous and visceral leishmaniasis among the dogs of Old Bokhara, it was found to be positive both in diseased and in apparently healthy animals. In order to eliminate the influence of endemicity from the results, a similar investigation was carried out in Moscow where leishmaniasis is absent. Working with cultures of various leishmanial strains, the author obtained results similar to those in Bokhara: the reaction was negative in 16 dogs and positive in 19. In the course of the investigation it was observed that washed platelets did not take part in the adhesion, that immunization of dogs with leishmanias did not increase the reaction and that the reaction was not specific, since in cross-infections specific differentiation of the leishmanias could not be obtained.

C. A. Hoare.

GIRAUD (P.) & CIAUDO. Valeur de la réaction au sulfarsénol (Camino-petros) pour le diagnostic de la leishmaniose interne. [The Sulpharsenol Reaction in the Diagnosis of Kala Azar.]—*Bull. Soc. Path. Exot.* 1935. May 8. Vol. 28. No. 5. pp. 379-381.

CAMINOPETROS (J.). Remarques sur la communication de MM. Giraud et P. Ciaudo. "Sur la valeur de la réaction au sulfarsénol pour le diagnostic de la leishmaniose interne."—*Ibid.* July 10. No. 7. pp. 562-566.

CAMINOPETROS in 1934 described a new serological test for kala azar. This consisted in adding the serum to be tested drop by drop to 2 cc. of a 2.0 per cent. solution of sulfarsenol in distilled water. Sera from normal individuals or from cases other than those due to leishmania either produce no change in the solution or a slight turbidity which disappears when the 3rd to the 5th drops have been added. With kala azar sera the turbidity which appears is said to persist up to the 7th drop and sometimes up to the 20th. With a view to testing this procedure the authors have carried out the method on the sera of 100 cases of illness not due to leishmania infection. With these the original claim was substantiated, for a turbidity which appeared with 88 sera disappeared at latest on the addition of the 5th drop. In the case of 7 sera from dogs suffering from kala azar the turbidity persisted to the 4th to 6th drops in 4 cases, to the 7th in 2 cases and to the 10th in 1 case. For sera from 4 cases of human kala azar the turbidity disappeared at the 3rd, 4th and 5th drops. The authors conclude that the test is less reliable than other similar ones which have been proposed.

In the second paper the author replies to the criticism of his method by GIRAUD and CIAUDO. He points out that they did not carry out the test as advised by him in the first place. It is important to note that in the case of kala azar sera the turbidity which forms in the sulfarsenol solution transforms itself into floccules which sink to the bottom of the tube. Eventually a stage is reached when there is a collection of floccules covered by a perfectly clear fluid. The floccules themselves gradually dissolve leaving finally a clear yellow liquid. It is this deposition of floccules and their behaviour which is diagnostic of kala azar and not the mere production of turbidity.

C. M. W.

VERDE (Michele). Il valore della feroreazione di Auricchio e Chieffi per la diagnosi della leishmaniosi infantile. [**Auricchio and Chieffi's Ferro-reaction in Infantile Kala Azar.**]*—Pediatria.* 1935. Aug. 1. Vol. 43. No. 8. pp. 894-904. [32 refs.] English summary (7 lines).

The author has tested the iron reaction on the serum of a number of cases of kala azar and comes to the conclusion that of all serological tests for this disease it is the most reliable. The test consists in the appearance of opalescence when a mixture of 1 cc. of a 1 in 600 solution of peptonate of iron (Merck) and 0.2 cc. of serum is incubated at 37°C. for 10 to 40 minutes. C. M. W.

AURICCHIO (L.) & CHIEFFI (A.). Sul meccanismo della reazione al peptonato di ferro proposta per la diagnosi della leishmaniosi interna dell'infanzia. [**The Peptonate of Iron Reaction in Kala Azar.**]*—Pediatria.* 1935. July 1. Vol. 43. No. 7. pp. 745-750. [14 refs.] English summary (6 lines).

The authors conclude that the opacity which is produced by the addition of peptonate of iron to the serum of kala azar cases and which they believe can be employed as a test for the disease is brought about by the high concentration of euglobulin in the serum of such cases. C. M. W.

FABIANI (G.) & DENDALE (R.). Valeur de la lactogélification du sérum sanguin comme test de guérison du kala-azar. [**The Lactic Acid Test in Kala Azar.**]*—Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 560-562.

Comparing the turbidity produced in the serum of kala azar cases by adding lactic acid with that given by the addition of formalin (formol-gel reaction) the author claims that the lactic acid produces its effect immediately it is added to the serum taken at the height of the disease, whereas the formol-gel reaction may not be evident for some minutes. Furthermore during recovery, when the formol-gel test has ceased to give a positive result, the lactic acid test may be still positive, proving that the lactic acid test is actually more sensitive than the other. Neither reaction, however, is absolutely specific for kala azar. C. M. W.

CARTANA (P.). Leishmaniose canine. Valeur de la réaction de gélification au formol et de la réaction au formol-stibosane pour le diagnostic. [**The Formol-Gel and the Formol-Stibosan Tests compared in the Diagnosis of Leishmaniasis.**]*—C. R. Soc. Biol.* 1935. Vol. 120. No. 29. pp. 63-65.

The formol-stibosan reaction carried out as described by NATTAN-LARRIER and GRIMARD-RICHARD by adding to 0.5 cc. of serum 4 drops of a 10 per cent. solution of neostibosan in 0.5 cc. of formol has given the author varying results in the case of 200 dogs examined for evidence of leishmania infection in Barcelona. Some sera flocculate almost instantaneously and after a few minutes develop into large clots which fill the tube, others flocculate just as rapidly but do not form clots, others again form smaller floccules which on sedimentation fill not more than half the tube, while others produce much finer

floccules which give merely a deposit at the bottom of the tube. The first three results are regarded as definitely positive. As regards the formol-gel reaction the development of opacity within 6 hours of the addition of formol to the serum is read as positive. Of the 200 sera 44 were positive and of the animals from which these 44 were taken only 5 had visceral leishmaniasis. Of the 44 positive sera 12 were positive to both tests while 32 were positive only to the formol-stibosan test. Of the 200 dogs, all of which were examined post-mortem, only 5 were found infected and all these 5 gave sera positive to both tests, on the other hand not all the dogs giving both tests positive were infected. It would appear therefore that the formol-gel test is more reliable than the formol-stibosan test. C. M. W.

D'OELSnitz. Similitudes et dissemblances cliniques du kala-azar autochtone de l'enfant et de l'adulte. [**Clinical Resemblances and Differences between Infant and Adult Kala Azar.**—*Bull. Acad. Méd.* 1935. May 21. 99th Year. 3rd Ser. Vol. 113. No. 19. pp. 667-669.

The author calls attention to various differences which he has noted in the clinical manifestation of kala azar in infants and adults, differences which he considers due to the fact that in adults the disease progresses slowly, often with remissions, whereas in children it develops more rapidly and steadily till death takes place. In both children and adults there is a serious danger of intercurrent infections. The chief differences noted are in the temperature curve, the colour of the skin and the severity of the anaemia. C. M. W.

VIRNICH (A.). Kala-Azar bei einem Europäer in China. [**Kala Azar in a European in China.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Aug. Vol. 39. No. 8. pp. 345-347.

The case recorded is that of a 24-year-old Russian who was found to have kala azar in Shanghai where he had been resident 9 months before the illness commenced. Previously he had resided in Pekin. It is not clear where the disease was contracted for Shanghai is not recognized as an endemic focus. The author thinks it is difficult to admit an incubation period of over 9 months. C. M. W.

PETROV (V. B.). [**A Case of Kala Azar in an Adult from Tadjikistan.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 1-2. [In Russian pp. 105-106.]

The total number of cases of kala azar recorded in Tashkent since 1928 was 437, the majority (61.12 per cent.) being infants from 1 to 3 years old. In the present report a description is given of a case in an adult who contracted the disease in Tadjikistan. It is the first record from that region. C. A. Hoare.

POPOV (P.). [**On Papataci Fever, Sandflies and Leishmaniasis in Azerbaijan.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 1-2. [In Russian pp. 107-111.]

The author records for the first time the occurrence of papataci fever in Azerbaijan, and reviews the incidence of oriental sore, kala-azar and

canine leishmaniasis in that country. A description is also given of the local species of *Phlebotomus*. Numerous hamsters, *Cricetulus migratorius pulcher*, were examined for the presence of leishmaniasis with negative results.

C. A. Hoare.

CHIEFFI (Angelo). Un secondo caso di leishmaniosi infantile osservato a Sassari (associazione malaria-leishmaniosi). [**Malaria and Leishmania Infection associated in Sassari (Sardinia).**]—*Pediatrics*. 1935. Sept. 1. Vol. 43. No. 9. pp. 1073–1079. [13 refs.] English summary (6 lines).

The case recorded is from Sardinia and is that of a child 3 years old in which both a malarial and leishmania infection were demonstrated.

C. M. W.

SEI (Mo Ten). **The Changes of Blood in Kala-Azar.**—*Jl. Oriental Med.* 1935. Apr. Vol. 22. No. 4. [In Japanese. English summary p. 64.]

From a study of cases of kala azar in Mukden the author finds that the anaemia is the result of parasitic interference with the haematopoietic function of the bone marrow. The erythrocytes are thus biochemically similar to those of healthy blood though they are fewer in number. The diminution in number of the white and red cells is not always uniform, the ratio white to red being generally high but sometimes very low. The resistance of the red cells to hypotonic salt solution and saponin is not altered. There is a reduction in the viscosity of the blood, a delay in the coagulation time and an acceleration in the sedimentation of the red cells.

C. M. W.

PIÉRI (Jean). Deux cas de kala-azar de l'adulte à évolution chronique. [**Two Chronic Cases of Kala Azar.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1935. July 8. 51st Year. 3rd Ser. No. 23. pp. 1122–1129.

A record of the history and successful treatment of two cases of kala azar in adults from Marseilles, the one 40 and the other 60 years of age.

C. M. W.

SMITH (R. O. A.) & HALDER (K. C.). **Some Observations on Dermal Leishmaniasis.**—*Indian Med. Gaz.* 1935. Oct. Vol. 70. No. 10. pp. 544–550. With 8 figs.

The paper describes cases of dermal leishmaniasis of the post kala azar type which have been seen at the School of Tropical Medicine, Calcutta, since NAPIER and Das GUPTA's accounts in 1930 and 1934. A fibroid type of the disease in which there is thickening and swelling of the fingers is noted for the first time. A leprous type is described and figured, in which an extensive nodular condition of the skin of the face and other parts renders a differential diagnosis from leprosy difficult. In an ulcerative type the nodules have a tendency to break down and ulcerate, in which case examination for leishmania is carried out as in oriental sore. It is noted that, contrary to the general rule that the dermal condition appears some time after apparent recovery from kala azar, one case was seen in which the visceral and cutaneous

infections were present at the same time. As regards treatment of the condition, an advance appears to have been made in the discovery that a course of potassium iodide, which may cause the nodules of some cases to ulcerate, definitely helps the course of antimony. The good effect of iodides before the course of antimony is best seen in the leprous, xanthoma and fibroid types. Individual nodules have been successfully treated with local injections of berberine sulphate. It has been shown that the sandfly *Phlebotomus argentipes* is as easily infected by feeding on the dermal lesions as by feeding on cases of kala azar. They are even fairly easily infected by feeding on the depigmented patches; in fact a diagnosis can more readily be made in this way than by searching for parasites in smears or cultures made from the lesions. In one case, out of 5 attempted, sandflies were infected by feeding on the chin of an individual who had had kala azar 2 years previously and who showed no signs of the dermal infection. The chin was chosen as the lesion of dermal leishmaniasis often appears there first. The paper is illustrated by a number of photographs depicting the various conditions described. C. M. W.

AMALFITANO (Gabriele). La leishmaniosi cutanea e gli inerenti problemi non ancora risolti. [**Unsolved Problems of Oriental Sore.**—*Riforma Med.* 1935. Sept. 7. Vol. 51. No. 36. pp. 1351-1358. With 9 figs.

The paper, after a general discussion on oriental sore, describes 8 cases which were seen at a clinic in Rome in the course of a few months. All the cases were from the country east of Rome, an endemic focus of the disease having been brought to light in Abruzzo in 1934.

C. M. W.

BENNETT (S. C. J.). **Equine Cutaneous Leishmaniasis: Treatment with Berberine Sulphate.**—*Jl. Comp. Path. & Therap.* 1935. Sept. Vol. 48. Pt. 3. pp. 241-243. With 2 figs. on 1 plate.

A Sudan pony 8 years of age developed on its belly an ulcer with raised edges and central granulation tissue discharging an exudate which dried to form an easily removed crust. The lesion, about 3.5 cm. in diameter, resisted all ordinary treatment. Smears made from the granulation tissue gave an appearance indistinguishable from that obtained from a human oriental sore, the parasites, which were plentiful, being morphologically identical with *Leishmania tropica*. For treatment after discovery of leishmania 4 cc. of a 1.0 per cent. solution of berberine sulphate were injected through 7 or 8 punctures around the edge of the sore. The single treatment brought about a cessation of the discharge and the progressive growth of epithelium over the sore, and though there developed a marked oedematous swelling of the region of the sore the healing continued steadily till at the end of 5 weeks both the swelling and the sore had disappeared. This appears to be the first case on record of what must be regarded as oriental sore in a horse. Leishmania infection of the spleen of a horse which died of an undiagnosed condition was described by RICHARDSON in Uganda in 1926 (*Trans. Roy. Soc. Trop. Med. & Hyg.*, Vol. 19, p. 411). C. M. W.

Row (R.). **On the Longevity of *Leishmania tropica* in Culture.**—*Bull. Soc. Path. Exot.* 1935. Apr. 10. Vol. 28. No. 4. pp. 269–270.

In view of papers which have been published recently on the length of time leishmania will survive in culture, the author notes that in his medium, consisting merely of a simple haemoglobin saline solution, he has had survival up to 110 days. C. M. W.

ZIA (Lily S.) & TENG (C. T.). **Survival, Growth and Flagellation of *Leishmania donovani* in the Presence of Contamination with Bacteria.**—*Chinese Med. Jl.* 1935. Apr. Vol. 49. No. 4. pp. 304–312.

— & —. **Resistance in vitro of *Leishmania donovani* to Contamination with Bacteria.**—*Proc. Soc. Experim. Biol. & Med.* 1935. Apr. Vol. 32. No. 7. pp. 1010–1012.

By employing as medium a mixture of 0.4 cc. 10 per cent. solution of sodium citrate, 0.5 cc. of human serum and 0.5 cc. of deposit of red cells in place of the usual N.N.N. medium the authors have shown that *Leishmania donovani* from hamsters will not only flagellate but will survive in the flagellate state for a month in association with various streptococci, staphylococci and pneumococci. The only organism which had a detrimental effect was *Bact. coli*. These experiments appear to the authors to afford an explanation of the presence of living leishmania in nasal secretion, as has been demonstrated in cases of kala azar. C. M. W.

LIDDO (S.) & BOGLIOLO (L.). Tentativi di filtrazione del virus leishmaniosico (*Leishmania tropica* e *Leishmania donovani*, nelle fasi flagellata ed aflagellata). (Nota sperimentale.) [**Filtrability of *Leishmania* Cultures.**]—*Pathologica.* 1935. June 15. Vol. 27. No. 524. pp. 383–386. [22 refs.] English summary (9 lines).

Attempts to demonstrate the presence of a filtrable phase of leishmania in cultures of these organisms have failed. C. M. W.

NATTAN-LARRIER (L.) & NOUGUÈS (S.). Les variations du tropisme de *Leishmania donovani* chez les diverses espèces sensibles. [**Tropism in Animals infected with *L. donovani*.**]—*C. R. Soc. Biol.* 1935. Vol. 119. No. 24. pp. 987–989.

In kala azar infections, whether in man or animals, the liver and spleen are always infected and in these organs the leishmania take up typically a position in the endothelial cells. This fundamental tropism for cells of mesodermic origin is common to all animals which can be infected. In addition, however, there is an accessory tropism, the features of which are peculiar to each type of animal. It is the cause of the differences in the character of the infection in different animals. The special features of infections in man, dog, hamster and other animals are discussed. C. M. W.

CHUNG (Huei-Lan). Ueber Zellteilungen bei *Leishmania donovani* enthaltenden Klamatozyten und ihre Bedeutung bei der Ausbreitung der Infektion im R.E.S. [**Clasmatocyte Cells and Infection of the R.E.S. in Kala Azar.**]*—Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Nov. Vol. 39. No. 11. pp. 474–482. With 17 figs.

Two normal hamsters and two which were infected as the result of an injection given 2 months before were injected intraperitoneally with the fluid from a heavily infected emulsion of the spleen of a kala azar hamster. Two of the animals were killed 46 hours later and two after 68 hours. Cover glass preparations were made by smearing them on both the parietal and visceral peritoneal surfaces. These were dried and stained with Leishman stain. The most striking feature of these preparations was that in all of them there were present large cells of the clasmatocyte type 90 per cent. of which contained leishmania in numbers varying from 1 to 40 or more per cell. Another point was that many of these cells had nuclei in process of mitotic division which appeared to be proceeding quite normally in the parasitized cells. It would seem, therefore, that not only does the reticulo-endothelial system hypertrophy as a result of the infection but also that a distribution of the leishmania throughout the body may be a result of the actual multiplication of the cells containing parasites.

C. M. W.

REDAFLI (Piero) & PRIMA (Antonio). Problemi anatomici, istopatologici e patogenetici della leishmaniosi viscerale del bambino. Con illustrazione di tre casi. [**The Histopathology of Kala Azar in Children.**]*—Sperimentale.* 1935. Feb. Vol. 89. No. 1. pp. 3–34. [20 refs.] English summary.

From a detailed study of the histopathology of three fatal cases of kala azar the authors conclude that the varying features of the disease are a result of the varying response of the reticulo-endothelial system to the parasitic invasion. The parasite, which is a passive body, is actively phagocyted by the host cell. The cell is incapable of destroying the parasite, which finds the cell a medium suitable for its development. Attention is drawn to the fact that in certain fatal cases of kala azar there appears to be a decrease in the number, or complete disappearance, of the parasite during the last phases. The paper is of the nature of a lengthy philosophic discussion and gives little new information.

C. M. W.

GUHA (Pran Kumar). **Studies in Kala-Azar. With Special Reference to the Liver Function, before and after Treatment with Pentavalent Antimony Compounds (Urea Stilbamine).***—Calcutta Med. Jl.* 1935. Oct. Vol. 30. No. 4. pp. 193–218. [68 refs.]

An investigation of 23 cases of kala azar, 8 of them after treatment with urea-stilbamine, has shown that in all the liver function, as judged by the levulose tolerance test, was normal. Urobilinuria was present in all cases. Of the 15 cases examined before treatment 11 showed the van den Bergh reaction to be negative while 4 showed a delayed positive van den Bergh reaction. Of the delayed positive cases one gave a high icterus index and bilirubin content of the blood in the range of latent

jaundice. The icterus index of 11 cases was taken before treatment. In seven of these it was normal while in 4 it was higher than normal and in the range of latent jaundice. There was a tendency for the index to fall during urea-stibamine treatment, which has the general effect of bringing about a return to normal of the other reactions also.

C. M. W.

LEE (C. U.) & CHU (C. F.). **Relative Value of Urea Stibamine and Neostibosan in the Treatment of Kala-Azar.**—*Chinese Med. Jl.* 1935. Apr. Vol. 49. No. 4. pp. 328-339. [18 refs.]

The observations were made at the Peiping Union Medical College. It was found that an adequate course of urea-stibamine for a child was 1.0 to 1.5 gm., as contrasted with 1.5 to 2.5 for neostibosan. For an adult the figures were 1.5 to 2.5 and 4.0 to 5.0. Urea-stibamine is thus definitely more potent than neostibosan which, on the other hand, has the advantage of being a definite chemical compound of a lower toxicity. After treatment with either of these drugs patients must be followed for at least 7 months to a year before cure can be pronounced.

C. M. W.

MARTIN (R.), CHORINE (V.) & ROUÉSSE (G.). **Un cas de kala-azar de l'adulte stibio-résistance, splénectomie, guérison. [A Case of Kala Azar cured by Neostibosan after Splenectomy.]**—*Bull. Soc. Path. Exot.* 1935. May 8. Vol. 28. No. 5. pp. 382-389.

The case described is that of a Russian 21 years of age who contracted kala azar in the south of France. Treatment with neostibosan at first brought about improvement which, however, was not maintained, the case becoming completely antimony resistant. As ground was being lost splenectomy was performed. A good recovery from the operation occurred and after further treatment with neostibosan a cure was effected. A spleen puncture performed 4 days before the operation confirmed the diagnosis of kala azar but was followed by signs of internal haemorrhage which, however, ceased after several hours.

C. M. W.

NAAB (J. P.). **Ein hartnäckiger Fall von Kala-Azar (Leishmaniosis interna).** [**Kala Azar Resistant to Treatment.**]—*Muench. Med. Woch.* 1935. Nov. 1. Vol. 82. No. 44. pp. 1756-1758.

The case described is that of a man 40 years of age who became ill in Istanbul a year after going on holiday to Greece and Palestine. The case was very resistant to treatment, though a cure was eventually effected after courses of neostibosan, tartar emetic and foudadin.

C. M. W.

RAY (J. C.). **Studies on Protozoal Vaccine. Part I. Oriental Sore Vaccine.**—*Indian Jl. Pediatrics.* 1935. Apr. Vol. 2. No. 7. pp. 149-158. With 14 figs. on 4 plates.

In this paper the author gives an account of the treatment of oriental sore with a vaccine prepared from the culture forms of leishmania. The flagellates obtained from the first or second subculture on the surface of a blood agar medium are suspended in phenolized saline to give 20 million flagellates per cubic centimetre. The first dose of

vaccine given subcutaneously is 0.5 cc. for an adult. Other injections are given at intervals of 4-7 days, the dose being increased according to the degree of reaction. The number of injections required varies from 3 to 5 according to the type of case. Of 187 cases treated a cure was effected in 151, while of the remainder 24 showed definite improvement. The duration of treatment varied from 15 to 28 days.

C. M. W.

KASSIRSKY (I. A.). [Treatment of Cutaneous Leishmaniasis with Ricinus Seeds.]—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 1-2. [In Russian pp. 67-69. With 2 figs.]

The author describes the treatment of the ulcerating form of oriental sore in Tashkent with an ointment made from the whole seeds of Ricinus, ground up and mixed with 10 per cent. vaseline. The ointment, based on a local remedy, was applied every few days to the ulcer which was either covered with a collodion dressing or bandaged. The first application usually produced considerable irritation and a copious discharge of pus, but as the treatment proceeds, the irritation diminishes and healing may take place after 3 or 4 applications. The active principle is apparently ricin, a toxalbumin which, according to NOGUCHI, agglutinates red corpuscles and leishmania. The author believes that ricin also stimulates the production of local immune bodies and is toxic to the flagellates and the pyogenic bacteria. The total number of cases successfully treated without leaving any traces was 16, some of which were in a very serious condition owing to various complications and had not responded to treatment by other methods. An attempt to apply the active principle to the treatment of canine visceral leishmaniasis failed for aqueous extracts containing 0.000004 gm. ricin introduced intramuscularly killed the dogs after the first or second injection.

C. A. Hoare.

THE TYPHUS GROUP OF FEVERS.

- MEGAW (John). **Typhus Fevers in the Tropics.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. July 31. Vol. 29. No. 2. pp. 105–110.
- FLETCHER (William). **Typhus Fevers in Malaya.**—*Ibid.* pp. 111–112.
- FELIX (A.). **The Serology of the Typhus Group of Diseases.**—*Ibid.* pp. 113–118. [10 refs.]

A discussion on the subject at a meeting of the Royal Society of Tropical Medicine on the 20th June, 1935.

The discussion was opened by Sir John Megaw who spoke much on the same lines as he had done in opening a similar discussion at the Section of Tropical Diseases of the British Medical Association at Bournemouth in the previous year. Sir John referred to the recent work of ZINSSER who has suggested that Brill's disease in New York is neither flea-borne nor lice-borne typhus but that these cases are recrudescences of the disease originally contracted in Europe; over 90 per cent. of the cases occur in immigrants and the disease does not spread to contacts born in America; some of these people had been more than 20 years in the country before they developed the disease.

Sir John emphasized the fundamental importance from the epidemiological standpoint of the fact that louse-borne typhus is carried from man to man by the louse whereas the other typhus fevers are conveyed from an animal reservoir to man by fleas, ticks or mites and so are non-epidemic, sporadic, place diseases.

Dr. Fletcher, who followed, emphasized some recent advances in our knowledge of this group of fevers. In Malaya when tropical typhus was first discovered in 1924 it was a new disease in that country, but since then the number of cases has increased and the severity of the disease is now much greater, a mortality rate of nil in 1924 has increased to 12 per cent. in 1934.

It has also been shown by LEWTHWAITE that in Malaya there are numerous typhus viruses in the rats of that country, strains of these viruses differ antigenetically not only from one another but also from the human typhus virus.

Dr. Fletcher was of opinion that the most satisfactory method of classification of the typhus group of fevers would be primarily on a serological basis and secondarily by the vector; a serum test can be applied to every case whereas in many cases it is not possible to prove the vector. On the other hand a classification on a serological basis alone is not possible, for example, the diseases due to the virus corresponding to X19 must be divided into flea-borne and louse-borne [and even tick-borne, São Paulo typhus].

Dr. Felix referred to the close correlation between cross immunity and agglutination reactions with various types of *Proteus* X. He illustrated this by means of tables. Dr. Felix did not agree that the typhus group of diseases could be classified according to the vector only; it has been shown that the viruses of louse-borne typhus and flea-borne typhus are antigenetically identical yet their methods of transmission are entirely different; also cases of so-called tick typhus in India belong to a variety of serologically different types of typhus. In conjunction with Colonel Heatley SPENCER, Dr. Felix suggests a classification based on antigenetic types of virus on which immunity and immunity reactions depend. This classification was demonstrated in a table which has already been reproduced in this *Bulletin* [1933, Vol. 30, p. 406].

D. Harvey.

WESTRA (S. A.). Nieuwere inzichten inzake de groep der vlektyphusachtige ziekten. [**The Newer Views on the Group of Typhus-like Diseases.**—*Nederl. Tijdschr. v. Geneesk.* 1935. Oct. 12. Vol. 79. Supp. to No. 41. pp. 4835–4847 (411–423).]

Dr. Westra gives a detailed and critical account of the epidemic and endemic typhus group of diseases. His classification reduces them to 3 groupings :—(a) Macular typhus in its epidemic and endemic forms, comprising the epidemic typhus of Europe with the body louse as vector and the endemic murine typhus with its rat-flea-man cycle as exemplified by Brill's disease, "shop" typhus and tabardillo. These are characterized by high serum-agglutination of *Proteus* X19 and absence of primary lesion. (b) The sub-group of Rocky Mountain fever and its allied affections, such as *fièvre boutonneuse*, with a tick as insect vector, dog or rodent as reservoir and possibly some serum agglutination of both *Proteus* X19 and XK. There is evident too in these forms a primary lesion. (c) The sub-group of tsutsugamushi, all mite fevers, and characterized by a rat- or mouse-mite-man cycle and strong *Proteus* XK agglutination. Examples of these are the scrub typhus of Malaya, the tsutsugamushi of Japan and the mite-fever of Sumatra and Java.

A correlation appears to exist between the crossed immunity reactions of each disease form, the type of insect vector and the respective agglutination titres obtained with the different *Proteus* X strains. This correlation can scarcely be accidental. It is indeed suggestive of some new relationship between virus and *Proteus*, whether of a symbiotic nature or perhaps even a genetic, considering the lack of our systematic knowledge of the Rickettsiae.

The author too makes reference to the unitarian views of FELIX and RHODES, who would ascribe all typhus-like diseases to one and the same virus, which should then be regarded in its different manifestations simply as a serological variant.

Epidemic typhus, it is emphasized, has a very special position of its own as being transmitted by a human ectoparasite from man to man ; the occurrence of typhus in man, for all the other forms, is an accidental circumstance only brought about by insect transmission of the virus from a warm blooded animal-reservoir and not at all from man to man. This latter point forms part of the dissertation of HOESEN who followed Westra and contends for the emendation of the Infectious Diseases Law of 1928 to give recognition to the difference in human infectivity of epidemic typhus and the typhus-like diseases. The law makes special provision for procedure in the case of cholera, yellow fever, plague, smallpox and typhus. He would propose :—(1) to substitute for "typhus" the term "typhus diseases" ; (2) to order segregation of the inmates of a dwelling from the patient only if the inspector has not declared in writing that segregation is not, or is no longer, necessary or that it may be replaced by supervision. W. F. Harvey.

HARVEY (D.). **Typhus Fevers.**—*Jl. Roy. Army Med. Corps.* 1935. July. Vol. 65. No. 1. pp. 1–8.

This review of the subject, amplified and brought up to date, is founded on a similar review written for and published in this *Bulletin* [Vol. 30, pp. 343–49, 406]. D. H.

NICOLLE (Charles) & LAIGRET (J). Vaccination contre le typhus exanthématique par le virus typhique vivant, desséché et enrobé. [**Anti-Typhus Vaccination by Living Virus.**]—*C. R. Acad. Sci.* 1935. Aug. 5. Vol. 201. No. 6. pp. 372-374.

The authors recall their suggestion made in 1911 that living virus might be employed as vaccine against true typhus but the method was abandoned as too risky. BLANC has used an attenuated rat typhus virus but in a good many cases fever has resulted after the inoculation. In the present paper the authors attempted to prepare a living vaccine made from a virus of rat typhus recently isolated in Tunis. This vaccine was prepared in the manner already described for yellow fever virus.

The virus employed was made from the brains of infected guineapigs and rats; the brains were ground up and dried and then enveloped in yolk of egg and suspended in water. The dose for vaccination was 1/200 of a brain. Out of 9 people treated with this vaccine 5 developed fever. It is noted that all 5 were inoculated from the brain of one rat. This method was abandoned and the virus was dried as before, enveloped in yolk of egg and suspended in oil instead of water; 1st dose of 1/800 to 1/200 of a brain; second dose 1/400 to 1/100; 3rd dose 1/10 and as a test of protection.

One hundred and ten people were treated with this vaccine; none developed fever and all showed immunity to test dose of rat virus. Also animals treated with this vaccine were found to be immune to a test dose of the historic virus. The authors again insist on the necessity of general lousing as the chief measure of prevention against historic typhus. D. H.

SHAHIN (Mohamed). Essai du vaccin antityphique (méthode de Weigl) en Egypte. [**Trial of Anti-Typhus Vaccine (Weigl's Method).**]—*Bull. Office Internat. d'Hyg. Publique.* 1935. Mar. Vol. 27. No. 3. pp. 481-482.

The vaccine (killed emulsion of Rickettsia from infected lice) was obtained from the Institute of Biology in Lwow. As only sufficient to inoculate 200 persons was procured it was decided to inoculate half of the inhabitants of the village of Ezbek and to leave the remainder as controls.

In each household half of the family were inoculated and the other half acted as uninoculated controls. Of 183 persons inoculated only two showed some slight rise of temperature. Two cases of typhus occurred in the village after the inoculations, both in non-inoculated people, none of the inoculated persons in the same households developed fever. D. H.

GAUD (M.). Sur la vaccination humaine contre le typhus par la méthode de G. Blanc. [**Vaccination against Typhus by the Method of G. Blanc.**]—*Bull. Office Internat. d'Hyg. Publique.* 1935. Mar. Vol. 27. No. 3. pp. 474-480. With 7 charts.

The murine typhus virus of Casablanca produces only mild fever in man. This virus obtained from the organs of infected guineapigs is diluted with saline and treated with ox bile and while still viable is inoculated into man and produces immunity usually without any appreciable reaction; nor can the virus be isolated from the peripheral

blood of the inoculated persons. Passage of this virus through guinea-pigs does not exalt the virulence either for men or for experimental animals. Seven hundred and twenty-three men in the jail at Adir were inoculated with the vaccine, which was prepared by Professor Blanc in the laboratory at Casablanca and sent to the jail where it was mixed with the bile just before the inoculations were made.

The infected guineapig was killed in the laboratory at 12 o'clock and the emulsion made and diluted 1/1,000, the vaccine was received at Adir at 2 o'clock and mixed with the bile and the inoculations were all completed by 3 o'clock in the afternoon.

Three hundred and nine men received 1 cc. of the 1/1,000 vaccine and 14 men 2 cc. Slight fever was noted in 5 of the men who received the 1 cc. dose and in 16 of those who received 2 cc. of vaccine.

Forty days later 5 uninoculated controls received 2 cc. of the virus and all reacted. Five men who had received 1 cc. of vaccine were also tested and 2 out of the 5 reacted. Five men who received 2 doses of vaccine were tested and none reacted.

D. H.

DIMITRIJEVIĆ-SPETH (V.). Die Abschwächung des Fleck-typhus-virus durch Gallebehandlung und Immunisierungsversuche mit gallegeschwächtem Hirnvirus. [**The Weakening of Typhus Virus by Treatment with Bile, and Immunity Investigations with Bile-treated Brain-Virus.**—*Zent. f. Bakt.* I. Abt. Orig. 1935. Apr. 25. Vol. 134. No. 1/2. pp. 67-70. With 1 fig.

The author has repeated the work of BLANC and his co-workers on vaccination with bile-treated typhus virus.

Guineapigs were employed in the work, and various dilutions of bile, 1/10 and 1/20, and undiluted bile were used; also the virus was exposed to treatment for periods ranging from 5 minutes to 160 minutes. It was found that when bile was mixed in equal parts with emulsion of brain and injected into guineapigs, after 15 minutes' treatment, the incubation period was prolonged and the duration of the fever was less than in controls; whereas after 30 minutes' exposure to the action of bile there was no fever at all in the inoculated animals, but later these animals reacted to inoculation with virus; immunity had not been established. Also repeated injections of bile-treated virus did not produce immunity in the guineapigs; indeed in some of the animals death resulted from the fever produced by the test dose—anaphylaxis is suggested to explain this.

D. H.

ZIA (Samuel H.). **Present Status on Vaccination against Typhus Fever.**—*Chinese Med. Jl.* 1935. July. Vol. 49. No. 7. pp. 679-686. With 2 figs. [22 refs.]

The author refers to the early work of NICOLLE on the immunization of persons against typhus by means of minimal doses of living virus from either blood or brain of experimental animals.

Owing to the length of time required to carry out this procedure and especially on account of the risk of producing the fever in the inoculated this method was abandoned. The author then refers to the preparation of vaccines from emulsions of Rickettsia obtained either from lice (WEIGL) or from rats and guineapigs (ZINSSER & MOOSER). These vaccines have been employed on a considerable scale and reports of

their use and the results have been summarized in this *Bulletin* from time to time. [See this *Bulletin*, 1933, Vol. 30, pp. 400, 887; 1934, Vol. 31, p. 248.] D. H.

BUSTAMANTE (Miguel), VARELA (Gerardo) & RÍOS NERI (Fernando). Profilaxis del tifo por medio de suero. [**Prophylactic Serum in Endemic Typhus.**]*—Bol. Oficina Sanitaria Panamericana.* 1935. June. Vol. 14. No. 6. pp. 511-518. With 4 figs.

An outbreak of endemic typhus (Mexican type) occurred in 1934 in San José del Pacífico in the State of Oaxaca and in the first 7 months there were 166 cases 26 deaths and in the last three months the increase was marked, cases numbering 25, 40 and 70 and deaths 2, 5 and 12 respectively. A serum was prepared by daily peritoneal inoculations of white rats with rickettsia emulsion obtained from an infected animal. The peritoneal cavity was then washed out and the fluid, which contained abundant rickettsia, was injected into a horse for production of antiserum. Altogether 169 patients [in another place the numbers total 166] were injected, 20 of them on two occasions with 5 cc. of the serum. Three among those inoculated contracted the disease within 15 days, but 7 among 39 not inoculated. Among the 20 reinoculated 3 were attacked within 30 days, none after that interval. Of the total 169, 13 or 7.6 per cent. were attacked within 60 days, but none died, whereas of 39 not injected 9 were attacked and 6 died. The authors conclude that the serum prepared with the Mooser strain of Mexican endemic typhus, "a strain with murine characters," is active prophylactically and in modifying the severity of the attack in outbreaks, and adds further proof that the endemic and epidemic typhus in this part of the world is of murine origin. H. H. S.

CIUCA (M.), BALTEANU (J.) & CONSTANTINESCO (N.). La maladie inapparente comme réservoir humain de typhus exanthématique. Son importance épidémiologique. [**The Epidemiological Importance of Inapparent Typhus Fever.**]*—Arch. Roumaines Path. Expér. et Microbiol.* Paris. 1935. Mar. Vol. 8. No. 1. pp. 99-110. With 7 figs. [19 refs.]

An outbreak of typhus occurred among a group of 20 agricultural workers who were crowded together in one small hut; of these 6 were sent to hospital with typhus.

The 14 contacts were cleansed, loused and rehoused; all of these remained healthy. The Weil-Felix reaction was tested and out of the 14, 8 gave a positive reaction, 6 were negative. Blood from each of the 8 men who gave positive reactions was inoculated into guineapigs and all reacted; these viruses were passaged and studied. Emulsion of the brain of a guineapig infected with this virus was inoculated into a patient with G.P.I. but produced no reaction. Blood taken from this patient and inoculated into a guineapig produced a typical typhus reaction and was passaged to rats and guineapigs; from these guineapigs another patient was inoculated and he developed a very definite 14-days' fever but without rash or other symptoms of typhus. Some 3 months later these two men were tested by the inoculation (accidentally) of virulent typhus blood; the man who had the inapparent infection developed fever and recovered, the other man who had had a definite fever did not react in any way; apparently the inapparent

infection had not developed immunity, whereas the definite attack of fever although without other symptoms had produced a solid immunity.

The virus disappeared from the blood of the contacts in from 10 to 15 days. Although these 8 men did not develop definite attacks of typhus yet they were reservoirs of the virus, and such contacts are a danger and may account for sudden outbreaks of the disease and for its endemicity. It is obvious that the occurrence of these inapparent infections is another argument for universal lousing of a population and not only of the actual cases of the disease. *D. H.*

LORANDO (N.). Sur quelques cas de typhus endémique (maladie de Brill) à Athènes. [**On Some Cases of Endemic Typhus in Athens.**] —*Rev. Méd. et Hyg. Trop.* 1935. Jan.-Feb. Vol. 27. No. 1. pp. 23-30. [14 refs.]

Boutonneuse fever has already been met with in Athens but the two cases here described could be clearly differentiated as typhus by reason of the distribution of the rash and the marked nervous symptoms. Also the Weil-Felix reaction was strongly positive for *Proteus X19* and the virus was readily transmitted to guineapigs by injection of 2 cc. of blood from the patients and gave rise to typical symptoms of endemic typhus in the guineapigs.

Rats were numerous in and about the houses in which the cases occurred. Some of these were captured and killed and the typhus virus was isolated from them. *D. H.*

STOTT (H.). **The Immunological Problems of the Typhus Fever Group as raised by a Sporadic Case of Typhus (Vector Unknown) from Hamirpur in the Plains of India with a Note on the History of Tick Typhus in India.**—*Indian Med. Gaz.* 1935. June. Vol. 70. No. 6. pp. 335-342. [11 refs.]

This paper commences if one might say so with an anticlimax; the author in the introductory paragraphs refers to two previous cases of "tick typhus" investigated at the Medical College Hospital in Lucknow and goes on to say that the present paper is concerned with the investigation of the third case of tick typhus in the same institution, but on turning over a page one finds the following sentence: "This third case is described here as tick typhus, but in fact the vector was unrecognized. A more accurate scientific diagnosis would be a case of sporadic typhus due to an unknown vector." [The same remark would apply to the two previous cases.]

The author goes on to refer to the work of MCKECHNIE who first recognized that a mild sporadic form of typhus existed in the Kumaon Hills in India and that this disease was not louse borne. MCKECHNIE's observations were not published in the journals but appeared in official publications in India and were brought to light by MEGAW, who himself contracted the disease in Kumaon and attributed it to a tick bite.

Similar mild forms of typhus had already been described in North Africa (CONNOR & BRUCH) and in South Africa (McNAUGHT) in 1910 and it had been suggested that these diseases might be due to tick bite although this was not scientifically proved until 1928 so far as these diseases are concerned.

The case under discussion in this paper was that of a missionary who had been camping in the Hamirpur district of Jhansi (where one of the two previous cases had also occurred) and he had undoubtedly been exposed to risk of tick bite. Clinically the case was typical of one of the typhus group of fevers, and showed a profuse roseolar maculopapular rash with dusky subcuticular mottling on the body, limbs, face, feet, and hands; a few small petechiae were also noted; muscular and joint pains in the limbs and back were severe and insomnia was a marked feature. Mentally there was no toxæmic dulling nor even headache. The fever lasted 21 days and the rash faded slowly and brown staining of the skin remained for many days. The author states that the clinical diagnosis of "tick typhus" was clear [but which form of tick typhus is meant? Rocky Mountain fever, São Paulo typhus, boutonneuse fever and South African tick bite fever are all forms of "tick typhus" but all differ clinically from one another]. The differential diagnosis is very carefully gone into, dengue, measles, cerebrospinal fever, louse-borne typhus, mite typhus and typhoid fever are all considered and excluded.

The third section of the paper gives an account of very careful serological investigations which revealed the interesting fact that the serum of this patient gave (1) a positive Wassermann reaction, which appeared early in the disease and again became negative 7 days after the fever had ceased; (2) a positive Widal reaction or at least a sympathetic rise of the inoculation agglutinins for *Bact. typhosum*; (3) a positive Weil-Felix reaction for *Proteus X19* up to a dilution of 1/25,000; this is not usual for other forms of "tick typhus" although as the author points out it has been met with in other cases of sporadic typhus in India.

D. H.

RAGIOT (Ch.) & DELBOVE (P.). Typhus endémique de Cochinchine. [**Endemic Typhus Fever in Cochin China.**—*Far Eastern Assoc. Trop. Med. Trans. Ninth Congress, Nanking, China, 1934.* Vol. 2. pp. 471-479.]

During the years 1933-1934 several cases of mild endemic typhus with a positive Weil-Felix reaction have been recorded in Saigon; other cases which were clinically the same but in which the Weil-Felix reaction was negative were also met with. A full clinical description of these cases is given; this does not differ from similar cases met with elsewhere as regards the rash, etc., but lung complications were common and "may dominate the clinical picture."

Three types of case are described in detail:—

1. Pneumonic case, with positive Weil-Felix reaction with *Proteus X19*.
2. Endemic typhus type of case; Weil-Felix reaction positive with *Proteus XK*.
3. Endemic typhus type of case; Weil-Felix reaction negative.

In none of these cases was a primary sore (tache noire) noted. The authors state that in Cochin China the disease differs clinically from epidemic typhus, Japanese River fever and boutonneuse fever, but resembles tabardillo, tropical typhus of Malay and especially the ship typhus of Toulon.

A virus was isolated from the blood of a patient and gave all the characteristics of a murine typhus virus; it has, however, not yet been possible to carry out cross-immunity tests. Lice were not found on any of the patients and there were no instances of cross-infection when cases were treated in general wards in hospitals.

D. H.

RAGIOT (Ch.) & DELBOVE (P.). Typhus endémique et typhus tropical en Cochinchine. [**Endemic Typhus and Tropical Typhus in Cochin China.**—*Bull. Soc. Path. Exot.* 1935. Mar. 13. Vol. 28. No. 3. pp. 163-167.

Cases of endemic typhus in which the Weil-Felix reaction was positive to *Proteus X19* and negative to *Proteus XK* have been recently reported from Cochin China. Three cases are reported in this paper in which the clinical symptoms were similar to the above (no primary sore) but the Weil-Felix reaction was positive for *Proteus XK* and negative for *Proteus X19*. A virus isolated from these cases gave the characteristics of a tsutsugamushi virus or scrub typhus of Malaya; one of these cases occurred in a child in a town and not on the plantations. D. H.

HERMANT. Au sujet du typhus exanthématique en Indochine. [**Typhus in Indo-China.**—*Bull. Office Internat. d'Hyg. Publique.* 1935. Mar. Vol. 27. No. 3. pp. 483-484.

An historical survey of the subject. The papers referred to have already been summarized in the *Bulletin*. D. H.

PRIEST (R.). **A Fever of the Typhus-Group amongst the British Troops in Egypt.**—*Jl. Roy. Army Med. Corps.* 1935. July. Vol. 65. No. 1. pp. 9-14. With 1 chart.

An isolated case of typhus fever is described. Fever lasted for 15 days with a profuse roseolar rash on the body and limbs, soles of the feet and palms of the hands; the Widal reaction was negative but it was noted that there was a sympathetic rise of the inoculation agglutinins in the blood; blood culture was negative; the serum taken on the 15th day of the disease gave a positive Weil-Felix reaction in a dilution of 1/1,250 with *Proteus X19*, negative to *Proteus XK*.

The patient remained in a drowsy condition throughout the fever; no primary sore or tache noire was detected and no lice were found on the patient or on his clothing.

There were no other cases in the barracks before or since. The case is argued from the clinical and epidemiological aspects and it is decided that this was a case of rat-rat-flea-man infection similar to cases reported in Toulon and other Mediterranean seaports.

D. H.

LASNET. Le typhus exanthématique en Algérie. [**Typhus in Algeria.**—*Bull. Office Internat. d'Hyg. Publique.* 1935. Aug. Vol. 27. No. 8. pp. 1546-1553.

Typhus fever occurs every year in Algeria and specially in the winter, it is louse-borne typhus.

There are certain centres of the disease where it seems to smoulder along and every year epidemics start from these centres, which are in the poorest parts of Algeria and epidemics occur if for any reason the economic condition of the people is lowered, for instance by drought and resulting famine. In good years there may be few or no cases, in bad years there may be many. Lice are always prevalent especially in the winter.

Nowadays the disease is spread from these centres by people travelling ; especially is this the case at religious ceremonies and on journeys to sacred shrines.

Prevention.—The first necessity is the discovery of the cases and notification of them. The second isolation of the patients. The third lousing of the patients and all contacts. If cases are few this may be done by the local medical authorities, but in the event of an epidemic, equipment and personnel is sent out from headquarters ; the method of choice for lousing clothing and bedding is by sulphur fumigation ; owing to the extreme scarcity of water in many localities steam is not available in sufficient quantity. Lousing stations are now established in these endemic centres. No explanation is given for the carry over of the infection from one epidemic season to another but it is suggested that mild or inapparent cases occur during the summer. D. H.

MOREIRA (João Affonso) & DE MAGALHÃES (Octavio). Typho exanthematico em Minas Geraes. [**Exanthematic Typhus in Minas Geraes.**]—*Brasil-Medico*. 1935. May 25. Vol. 49. No. 21. pp. 465-470. With 3 charts.

This is a record of experimental work on the transmission by the larval or adult forms of *Amblyomma cajennense* and of *Ctenocephalus felis* of the virus of typhus fever to a number of animals—dog, fox, teguexin [*Tupinambis teguexin*, a lizard-like creature], armadillo, opossum, chameleon, camondongo [Brazilian house-rat], brown and grey rats and the hare. The second and possibly others of these can be infected, but the opossum is the only natural reservoir of the virus. H. H. S.

PIZA (José de Toledo). Importance de la tique dans la dissémination du typhus exanthématique de Sao Paulo. [**The Tick as a Transmitter of São Paulo Typhus.**]—*C. R. Soc. Biol.* 1935. Vol. 119. No. 22. pp. 751-753.

The author refers to the work of MONTEIRO and others who have shown that the virus of São Paulo typhus can be carried to experimental animals by the tick *Amblyomma cajennense*. He describes the case of a lady who had a tick removed from the shoulder ; a primary ulcer formed at the site of the tick bite, and 4 days later this lady developed a severe attack of typhus fever with profuse rash and severe muscular pains.

A second similar case is described, the patient dying on the 13th day after the bite of the tick ; the incubation period in this case was only 24 hours.

The suggestion that lice may also carry the virus is discussed but the author does not consider that lice are carriers of the disease for several reasons, (a) the disease is not directly contagious and is sporadic, and (b) it is a disease of rural surroundings. D. H.

BERNALES (Juan Voto) & BAMBARÉN (Carlos A.). Segundo caso autóctono de fiebre exantemática observado en Lima. [**Another Indigenous Case of Typhus in Lima.**]—*Crónica Méd.* Lima. 1934. Dec. Vol. 51. No. 858. pp. 482-489.

This is the second case of " exanthematic fever " recorded as occurring in Lima. The patient was a man of 48 years and the disease

was severe, death taking place on the fourth day after his coming to hospital. The Weil-Felix reaction was negative, but clinically the symptoms were typical. The murine type is known to occur in Lima and the author concludes [on unstated grounds] that the infection was conveyed by rat fleas.

H. H. S.

LANGAN (A. M.) & MATHEW (R. Y.). **The Establishment of "Mossman," "Coastal" and Other Previously Unclassified Fevers of North Queensland as Endemic Typhus.**—*Med. Jl. Australia*. 1935. Aug. 3. 22nd Year. Vol. 2. No. 5. pp. 145–148. With 2 figs.

In June 1935 a number of cases of so-called Mossman fever occurred in this district and in Cairns and Tully. It has already been suggested that these fevers really belong to the group of typhus-like fevers. Several of these cases were studied by the authors and they note the extraordinary diversity of clinical type. For instance the fever may be long or short; lymphatic glands are enlarged in some cases not in others; some show nervous involvement others do not. In 8 cases observed two showed profuse typical rash, two showed no rash at all, four had slight and evanescent rash.

Weil-Felix reaction.—Of 8 cases tested one gave a positive reaction with X19 and 7 gave a positive reaction with XK. All these showed a rise of titre during the fever and early convalescence. The author considers that the failure to obtain a positive result in previous cases was due partly to the use of unreliable cultures and to the testing of the serum early in the fever and not repeating the test later on.

D. H.

GUNTHER (Carl E. M.). **Endemic Typhus in New Guinea.**—*Med. Jl. Australia*. 1935. June 29. 22nd Year. Vol. 1. No. 26. pp. 813–814.

Two cases of endemic typhus are described.

These two men in the course of their work, or rather on their way to work, had to pass through freshly felled bush where they were exposed to the bite of the "bush mokka" (mite) as it is known by the people locally. A primary sore was noted in each case and the fever lasted about 2 weeks with fever headache and profuse rash. The serum of one of the patients agglutinated *Proteus* XK up to a dilution of 1/160, but not *Proteus* X19; the other case was not tested.

D. H.

PLAZY (L.) & GERMAIN (A.). D'une modalité rare de la courbe thermique dans le typhus murin. [**A Rare Type of Temperature Curve in Endemic Typhus.**]—*Bull. Soc. Path. Exot.* 1935. Mar. 13. Vol. 28. No. 3. pp. 161–162. With 2 charts.

The fever in these cases was either remittent or intermittent, the Weil-Felix reaction was positive and a typical rash was noted. There were no rigors and no malarial parasites could be found. [The charts given recall those of cases of trench fever.]

D. H.

KODAMA (Makoto). Zusammenfassender Bericht ueber die Ergebnisse der experimentellen Fleckfieberforschung in Japan. [**A Summary of the Reports of Results of Typhus Fever Research in Japan.**]—*Zent. f. Bakt.* I. Abt. Ref. 1935. July 4. Vol. 118. No. 5/6. pp. 97–103. [27 refs.]

The majority of the papers referred to have already been summarized in the *Bulletin*.

The Manchurian endemic typhus is compared with Mexican typhus and it is agreed that clinically and epidemiologically they are similar; experimental work on animals also gives like results in the two countries. *D. H.*

GOODMAN (Charles) & BRODIE (Maurice). **A Skin Test indicating a Previous Typhus Infection.**—*Proc. Soc. Experim. Biol. & Med.* 1935. May. Vol. 32. No. 8. pp. 1332–1334.

Twelve men who had had typhus from 1 to 8 years previously were given an intracutaneous injection of 0.1 to 0.2 cc. of a *Rickettsia* suspension prepared from the tunica of infected guinea pigs; all 12 showed an erythematous indurated area of 1 cm. in diameter at the site of injection. Ten healthy adult guinea pigs by not had typhus were similarly inoculated, none of them with any reaction. *D. H.*

GOODMAN (Charles). **A Skin Test to suggest the Diagnosis of Recovered Typhus and Thrombo-Angiitis.**—*Bull. New York Acad. Med.* 1935. June. 2nd Ser. Vol. 11. No. 6. pp. 403–412.

The author traces a connexion between typhus fever and thrombo-angiitis obliterans, indeed he considers that this condition is a late manifestation of typhus fever.

In order to get support for his suggestion he employed a sensitivity test using a formalized emulsion of *Rickettsia* which was injected intracutaneously.

Eleven people who had had typhus were tested, all gave a positive reaction and 17 people who had suffered from thrombo-angiitis also gave a positive reaction; whereas 18 controls were all negative.

A discussion followed and it was pointed out that there were hundreds of cases of thrombo-angiitis in America which gave no history whatever of typhus; but the author is inclined to the opinion that this disease is due to the typhus virus and may cause the condition without any other symptom. *D. H.*

GIROUD (Paul) & PLOTZ (Harry). Immunité croisée entre les cultures de typhus exanthématique historique ou murine et les virus de passage. [**Cross Immunity between the Cultures of Historical and Murine Typhus and the Passage Virus.**]—*C. R. Acad. Sci.* 1935. Apr. 1. Vol. 200. No. 14. pp. 1255–1256.

The cultures employed were those of a Mexican murine virus and a European classical or historical virus. The strains of virus in passage were one Mexican rat virus and one Tunis rat virus and an historical virus.

The guinea pigs inoculated with the culture of true typhus virus and tested 3 months later were protected 11 times out of 16 against

the passage virus. The murine culture protected 13 times out of 15 against the passage virus.

The interesting point noted is that the infection produced by the cultures protected the guineapigs against the virus of passage better than the infection produced by the passage virus protected against the culture. D. H.

GIROUD (Paul) & PLOTZ (Harry). Étude expérimentale des infections, déterminées par les cultures des virus typhiques historique ou murin, et des immunités qu'elles déterminent vis-à-vis de ces virus ou de leurs cultures. [**Experimental Study of the Infections produced by Cultures of Historic Typhus or Rat Typhus and the Immunity produced against these Viruses or the Cultures.**]—*Arch. Inst. Pasteur de Tunis*. 1935. June. Vol. 24. Nos. 3 & 4. pp. 420-434. With 8 charts.

Tissue cultures of Rickettsia were prepared and studied as regards (1) infectivity for animals; (2) production of immunity.

The strains used in culture were: (1) Mexican rat virus, (2) European historic virus. Strains of passage viruses were: (1) Human virus of Tunis, (2) Mexican rat virus, (3) Tunis rat virus.

The medium in which the cultures were made consisted of Tyrode's solution 2 parts, guineapig serum (normal) 1 part, and fragments of normal tunica tissue cells. The inoculum was either infected tissue cells or brain tissue. These cultures were incubated at 37°C. for 10 days; subcultures were made from tissue debris of previous culture mixed with fresh normal tunica tissue. The European virus was subcultured 10 to 17 times and the Mexican virus 70 times. These cultures stained with Laveran-Borrel blue showed typical Rickettsia.

Inoculation of cultures of the human virus taken on the 10th day gave a typical fever in guineapigs without orchitis and when tested later these animals were immune to further inoculations of culture and virus.

Immunity reactions.—(1) Guineapigs inoculated with above cultures were protected 11 times out of 16 against the various passage viruses. (2) Guineapigs inoculated with the various passage viruses were protected 4 times out of 16 against the cultures of historic virus.

Inoculation of cultures of the Mexican rat virus produced fever in guineapigs and orchitis similar to that produced by inoculation of passage virus and gave immunity to further doses.

Immunity reactions.—(1) Guineapigs inoculated with the cultures of Mexican virus were protected 13 times out of 15 against inoculation of the passage viruses. (2) Guineapigs inoculated with the passage viruses were protected 3 times out of 14 against cultures of Mexican virus. These results are explained by the fact that the dose of Rickettsia or virus is much greater in the culture than in the blood of an infected animal or even in the brain. D. H.

GIROUD (Paul). Action sur le virus historique de Tunis du sérum antityphique murin de Zinsser. [**The Action of the Anti-Typhus Serum of Zinsser on the Historic Virus of Tunis.**]—*Arch. Inst. Pasteur de Tunis*. 1935. June. Vol. 24. Nos. 3 & 4. pp. 475-479. With 2 figs.

Guineapigs were employed in this research. These animals were inoculated with virulent blood from other guineapigs and 2 cc. of the

serum were given 2 hours, 24 hours, and 48 hours after the infecting dose. It was found that there was evidence of imperfect protection ; but if 3 doses were given the animals were protected against small doses of virus, *i.e.* guineapig brain. D. H.

PRICA (Milan). Die Ratten als Träger des Fleckfiebertvirus in Zagreb (Jugoslawien). [**Rats as Carriers of Typhus Virus in Zagreb.**]—*Zent. f. Bakt.* I. Abt. Orig. 1935. Apr. 25. Vol. 134. No. 1/2. pp. 63–67. [10 refs.]

Sixty-nine wild rats were captured in Zagreb and killed and the pooled blood was inoculated into guineapigs ; a positive result was obtained on three occasions. From 30 white rats in the laboratory a positive result was obtained on one occasion. Twenty out of 75 wild rats gave a positive Weil-Felix reaction (26·6 per cent.) whereas 18 out of 30 white rats gave a positive reaction (60 per cent.). The author suggests that the higher rate of infection among the white rats in the laboratory is due to the fact that they were crowded together in cages. D. H.

NICOLLE (Charles) & SPARROW (Hélène). Le faible pouvoir pathogène pour les petits singes du virus murin I des rats du port de Tunis, inoculé par les voies péritonéale, sous-cutanée et conjonctivale. [**The Feeble Pathogenicity for Small Monkeys of Rat Virus No. 1 of Tunis, inoculated by the Peritoneal Subconjunctival or Subcutaneous Route.**]—*Arch. Inst. Pasteur de Tunis.* 1935. June. Vol. 24. Nos. 3 & 4. pp. 461–474.

It is well known that monkeys are as a rule very susceptible to typhus virus both rat and human ; but it was found that this was not so with the No. 1 rat virus of Tunis. Six monkeys were inoculated intraperitoneally with this virus, only one had fever but all six gave a positive Weil-Felix reaction and were proved to be immune to typhus. The virus was even less potent when given by the conjunctival route and failed altogether to infect rats by this route [see following abstract]. D. H.

NICOLLE (Charles) & SPARROW (Hélène). Infection par voie conjonctivale des petits singes avec le virus typhique murin I des rats de Tunis. [**Infection of Monkeys by the Virus I of Rat Typhus via the Conjunctiva.**]—*C. R. Acad. Sci.* 1935. May 20. Vol. 200. Nos. 21. pp. 1702–1704.

The virus of epidemic typhus is frequently pathogenic by the conjunctival route. Lice faeces or the crushed bodies of lice may contaminate the fingers of workers and if the eye is rubbed infection follows ; several accidents in the laboratory have occurred in this way. The authors have shown that their No. 1 rat virus of Tunis is only feebly pathogenic for monkeys. The experiments recorded in this paper show that infection may be produced in monkeys if this virus is inoculated into the conjunctiva. Emulsion was made of the brain of rats and instilled into the eye, one drop at a time at half-hour intervals, 4, 5 and 8 drops. Of six monkeys tested none showed any fever but two gave a positive Weil-Felix reaction and when tested later were found to be immune to the epidemic typhus virus.

D. H.

SPARROW (Hélène). Etude d'un nouveau virus typhique murin, isolé d'un rat de la ville de Tunis. [**A New Strain of Rat Typhus Virus isolated in Tunis.**]*—Arch. Inst. Pasteur de Tunis.* 1935. Apr. Vol. 24. No. 2. pp. 218–253. With 12 charts.

This strain of virus was isolated from a rat captured in a house in the town of Tunis some distance from the port where previous strains already described had been isolated. There had been no case of typhus in this house for many years. In 25 guineapigs in which this virus was passaged fever resulted in all but two. As regards orchitis this was not seen till after the 6th passage and was regularly seen after the 21st passage. There was crossed immunity of this virus with other murine typhus viruses and with the epidemic or human virus.

Rats.—Of 49 used all showed fever except one. Fifty per cent. of the rats gave a positive Weil-Felix reaction. *D. H.*

SPARROW (Hélène). Enquête sur la présence du virus typhique chez les souris de Tunis. [**Search for Typhus Virus in the Wild Mice of Tunis.**]*—Arch. Inst. Pasteur de Tunis.* 1935. June. Vol. 24. Nos. 3 & 4. pp. 435–460. With 6 charts.

Three hundred mice were examined.

The brains were removed and kept in a frigidaire and tested for bacterial sterility. Lots of 2, 4 and 6 brains were emulsified and inoculated in doses of 1 to 2 cc. into rats and guineapigs. Two strains of virus were isolated from the mice.

These viruses were very carefully studied and were passaged in rats and guineapigs; the protocols of the experiment are given in full; crossed immunity experiments were carried out and showed the identity of the mouse virus with the virus No. 1 originally isolated from rats in the Port of Tunis; there was also immunity against epidemic virus but not so complete. None of the sera of mice tested gave a positive Weil-Felix reaction. Of 18 guineapigs inoculated with the mouse virus 13 developed orchitis. Rats inoculated with the virus had fever and a positive Weil-Felix reaction was observed, rabbits inoculated with the virus had an inapparent infection with a positive Weil-Felix reaction. *D. H.*

GIROUD (P.) & HABER (P.). Non adaptation du virus typhique historique à la souris blanche après électropyréxie par ondes courtes. [**Disappearance of Typhus Virus in White Mice after Treatment by Short Wave Electrotherapy.**]*—C. R. Soc. Biol.* 1935. Vol. 119. No. 17. pp. 135–136.

In previous work on the same lines the author has shown that the effect of electrotherapy on infected guineapigs is to prolong the period during which the virus remains viable in these animals. It is suggested that this is due to the action on the tissues causing a reduction, or preventing the production of antibodies. Similar work with white mice is recorded in the present paper and it was found that the electrical treatment had the effect of destroying the virus and it was not possible to passage the virus in treated white mice. *D. H.*

DONATIEN (A.) & LESTOQUARD (F.). Existence en Algérie d'une *Rickettsia* du chien. [*Rickettsia* in Dogs in Algeria.]—*Bull. Soc. Path. Exot.* 1935. June 12. Vol. 28. No. 6. pp. 418-419.

Dogs in the neighbourhood of the laboratory were found to be heavily infested with ticks (*Rhipicephalus sanguineus*); of 5 infested dogs 4 died. Examination of smears made from the walls of the large arteries revealed numerous typical *Rickettsia* in the monocytes; these organisms were also found in cells of the peripheral blood taken just before death.

Monkeys were inoculated with material from the dogs and they developed fever and *Rickettsia* were found in the blood of these animals also. [The author seems inclined to regard this as a special strain of *Rickettsia*, for which he proposes the name *R. canis*.] *D. H.*

LÉPINE (P.) & LORANDO (N.). Le typhus exanthématique du chat. [*The Virus of Typhus in a Cat*.]—*Bull. Soc. Path. Exot.* 1935. May 8. Vol. 28. No. 5. pp. 356-360.

During an investigation of an outbreak of endemic typhus in Athens one case was noted in a house in a street where several cases had occurred; on the bed of the patient a large black and white cat was sleeping. This cat was removed to the laboratory and killed and examined, an emulsion of the brain was inoculated into guineapigs and a typical murine typhus virus was isolated and passaged. This virus protected guineapigs against other typhus viruses both murine and human. Seventeen fleas [not named] were collected from the cat, emulsified and injected into guineapigs and a similar virus was obtained from these.

As there were no other cases in contact with this man and there were no rats in the house it is considered that he became infected from the cat. Eight other cats were examined all from the endemic area and only one of these was found to be infected. Experimental work was carried out with cats and it was found that cats are not readily susceptible and the virus does not persist in them for any length of time. Cats can be infected by the intestinal route if fed on spleen of infected guineapigs. *D. H.*

TAMURA (Shogoro). Vergleichungen der biologischen und immunologischen Eigenschaften jedes Stammes von Weil-Felix'schem Proteus-X. [*A Comparison of the Biological and Immunological Characters of Certain Strains of Proteus X*.]—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1935. June. No. 6 (363). [In Japanese pp. 757-804. With 5 figs. on 1 plate. German summary pp. 805-806.]

Three strains of *Proteus*, namely XK, X19 and X2 were obtained and the O and H varieties of each were compared and contrasted as regards the cultural properties, heat resistance and serological reactions. The sera of persons suffering from diseases other than typhus were also tested and it was found that the sera of some syphilitic patients agglutinated *Proteus* cultures in fairly high dilution.

D. H.

PARKER (R. R.). Rocky Mountain Spotted Fever : Results of Ten Years' Prophylactic Vaccination.—*Jl. Infect. Dis.* 1935. July-Aug. Vol. 57. No. 1. pp. 78-93. With 1 fig.

The method of preparation of this vaccine has already been fully described in previous papers. It is made by emulsifying the tissues of virus laden adult wood ticks in formol phenol saline. Five hundred ticks are emulsified at a time and make some 400 cc. of vaccine. Each batch of vaccine has to be standardized by protection tests with guineapigs and the dose estimated ; usually 1 cc. for children and 2 cc. for adults.

This vaccine was first used in 1925 as a prophylactic and in this paper the results of 10 years' trial are recorded.

At first only 10 litres of vaccine could be manufactured in a year but over 200 litres were prepared last year. In early days two test areas were selected, one in Montana where the cases were few but the case mortality high ; the other in Idaho where cases were more numerous and the mortality much lower. The results of the first four years' trial in these two districts were collected and studied and it was decided :—

1. That the vaccine had definite value for prevention.
2. In Montana with the virulent type of the disease the vaccinated had milder attacks and recovered, the unvaccinated died.
3. In Idaho against the mild type of the disease there was full protection in the vaccinated.

In the 10 years up to 1934, 150,000 people have been vaccinated and of these 64 have developed the fever, 45 of these in the same season in which they were vaccinated.

In the Bitterroot valley, Montana, the mortality in unvaccinated adults was 82 per cent. whereas the mortality among vaccinated adults was only 6.6 per cent.

There have been 22 cases of infection among the workers in the laboratory dealing with the Bitterroot virus. Seven of these were not vaccinated and all died, 15 were vaccinated and only one of these died.

As regards Idaho where the mortality is low, in 193 vaccinated shepherds frequently exposed to infection only one case occurred, whereas there were 22 cases among 364 controls similarly employed.

It may be said generally that the vaccine confers immunity against the mild virus and reduces the severity of the disease with the highly virulent strains. There is some evidence that the immunity extends into the second season after vaccination.

D. H.

MAILLARD (E. R.) & HAZEN (E. L.). Rocky Mountain Spotted Fever in New York State outside of New York City.—*Amer. Jl. Public Health.* 1935. Sept. Vol. 25. No. 9. pp. 1015-1017. [Abstract by the authors.]

A brief summary is presented of ten cases showing clinical evidence of Rocky Mountain spotted fever which have occurred in New York State (outside of New York City) from 1926 to 1934, as well as the results of the agglutination tests performed with *Proteus X19* with blood specimens from the patients.

In nine cases there was either clinical evidence of tick bite or a definite history of contact with ticks before the onset of illness. None of the cases could be associated with flea bites. The distribution and

character of the rash in the majority of the cases were strikingly similar, appearing early on the extremities, later becoming generalized.

An agglutination reaction was demonstrated with *Proteus* X19 and the blood sera from eight of the ten patients, and partial agglutination was obtained with two of the sera.

NICOLLE (Charles) & SPARROW (Hélène). Quelques expériences pratiquées avec le virus de la fièvre fluviale du Japon (Tsutsugamushi). [Experiments with the Virus of Japanese River Fever.] —Arch. Inst. Pasteur de Tunis. 1935. Apr. Vol. 24. No. 2. pp. 179–217. With 16 charts.

Two strains of the virus of Japanese River fever were sent to Tunis by Professor NAGAYO, only one of these strains, however, survived the journey and it is this strain, Chiba, which was employed by Professor Nicolle in the work described in this paper.

The virus arrived in a rat, after 4 passages on board ship on the way from Japan, and the blood of this rat proved infective for a monkey when inoculated into and under the skin. Forty-six monkeys in all were inoculated mostly as "indicators" of infection as these animals all reacted with fever whereas rats, rabbits and guineapigs had inapparent infections as a rule.

Of 12 monkeys which were inoculated with equal doses of virus full details are given; 11 reacted with fever, the incubation period was from 4 to 11 days and the duration of the fever varied from 2 to 11 days. No local lesion was noted in any of the monkeys although the virus was inoculated into and under the skin. The Weil-Felix reaction, which was tested in all cases, usually became positive after the fever had ceased, and although *Proteus* OX19 was agglutinated *Proteus* OXK was agglutinated in higher dilution. The former was agglutinated to a dilution of 1/160 in 3 cases, whereas the latter was agglutinated to 1/160 four times, to 1/320 three times, 1/640 once and to 1/1,200 twice.

It is interesting that the blood of monkeys reacts somewhat in the same manner as that of human beings whereas, as will be shown later, the blood of infected rats did not agglutinate *Proteus* OX19 but agglutinated *Proteus* OXK.

Rats.—The authors found that with the strain Chiba rats showed only an inapparent infection, the only signs of infection being that if the rats were killed from the 9th to 14th day after inoculation the organs were infective for monkeys and these animals died of fever. Also the Weil-Felix reaction of the serum of the rats was positive for *Proteus* OXK but not for *Proteus* OX19. ~~16~~ ¹⁶ ~~gave~~ ^{examined} 16 gave a positive reaction for *Proteus* OXK. The blood of rats when inoculated into the anterior chamber of the eye of rabbits did not produce the typical reaction described by Japanese workers. Nicolle considers that this was due to loss of virulence of the virus in rats. On the other hand blood of infected monkeys produced this typical reaction in the eye of rabbits. The blood of infected rats injected intrarectally in lice was followed by multiplication of Rickettsia in these insects.

Guineapigs.—Infection was usually inapparent but several animals had attacks of fever after incubation periods of 2 to 3 weeks. As regards the Weil-Felix reaction in these animals it is pointed out that the sera of guineapigs, whether infected or not, do not agglutinate

Proteus OX19 whereas that of normal guineapigs agglutinates *Proteus OXK*.

Crossed immunity experiments were carried out and it was found that river fever virus protected against itself, but not against typhus, nor did typhus virus protect against river virus. Extensive experiments were carried out with fleas and lice which were fed on infected animals. It was found that river virus remains active in lice for 7 days after the infected feed, but cannot be conveyed by their bite. The virus remains active in fleas for 11 days and *can* be conveyed by their bite.

D. H.

WOLFF (J. W.) & KOUWENAAR (W.). Onderzoekingen over de Sumatraansche mijtekoorts. IX. Ooginfecties bij konijnen. [**Sumatra Mite Fever. Eye Infection in Rabbits.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1935. May 14. Vol. 75. No. 10. pp. 805–810. With 5 figs. on 1 plate. English summary (10 lines).

The work of NAGAYO and others on the eye lesions obtained by injection of the virus of tsutsugamushi disease is recalled, and a description is given of the macroscopic and microscopic appearances produced. Soon after the publication of the Japanese work the authors proceeded to test the mite fever virus of Sumatra in the same way, but have obtained much less constantly positive results than the Japanese investigators. Albino rabbits are to be preferred, as the iris then has no pigment, and 0.2 cc. aqueous humor is withdrawn before the injection of 0.1–0.2 cc. infective suspension. The most constant results are obtained by using testicular passage suspension of rabbits and by subpassage with virulent aqueous humor. A positive reaction with patient's blood was only once obtained. Opacity of the cornea made its appearance between the 7th and 18th day. Rickettsia were present in all corneal preparations in large number especially from the posterior surface and were exclusively intracellular. The inflammatory cell reaction, a kerato-irido-cyclitis, was situated chiefly at the periphery of the cornea, at the junction of iris and cornea, round the canal of Schlemm and in the basal portion of the iris: it consisted of round cells and eosinophils. An exudate, which formed on the posterior surface of the cornea, showed the same cell elements. No general symptoms appeared except in three rabbits, which developed fever for a few days.

W. F. Harvey.

VAN WAARDENBURG (D. A.). Over een geval van tropical typhus en een geval van mijtekoorts in de Residentie Benkoelen.—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1935. May 28. Vol. 75. No. 11. pp. 878–892.

GIUNTA (Giuseppe). Sopra alcune febbri endemiche della costa dell'Oltregiuba. [**Some Fevers Endemic on the Coast of Oltregiuba.**—*Ann. di Med. Nav. e Colon.* 1935. July–Aug. 41st Year. Vol. 2. No. 1–2. pp. 493–511. [23 refs.]

[No atlas at our disposal mentions Oltregiuba, but from the casual mention in the text of Benadir, we infer it to be a district of Italian Somaliland.] Febrile attacks are designated by local names according to the districts where they occur such as Chisimaio, Benadir fever, in addition to the better known dengue and papataci fever and

influenza, which goes by the generic name of *kandu*. From the author's account they may be classed under one or other of these last three. A descriptive case of each is given. H. H. S.

CHRISTIAN (C. R.). **The Weil-Felix Reaction in Fevers of Uncertain Origin.**—*Jl. Roy. Army Med. Corps.* 1935. Oct. Vol. 65. No. 4. pp. 247-251.

Two mild cases of fever are described, in neither of these was any rash observed at any period, the fever in both cases lasted nine days and the highest point reached was 104.8°F.

Malaria was excluded by careful examination of blood films; blood, urine, and stool cultures attempted on several occasions during the fever were negative. The white blood cell count was normal, there were no enlarged glands and no other signs or symptoms.

The blood sera gave the following reactions expressed in standard agglutination units in the case of the Widal reaction:—

Case No. I.

					Day of Disease				
					4	7	11	15	19
<i>Weil-Felix</i> —									
"O"									
X19	...	...	...	...	17	0	0	44	25
X2	...	...	...	...	32	19	192	367	282
XK	...	...	...	...	64	64	220	367	367
<i>Widal</i> —									
T.	...	...	...	...	28	21	42	31	31
A.	...	...	...	...	28	16	48	48	35
B.	...	...	...	...	56	71	143	195	133
T. "O"	...	...	...	...	0	0	19	0	0

Case No. II.

					Day of Disease			
					6	19	13	17
<i>Weil-Felix</i> —								
"O"								
X19	...	...	...	...	22	44	44	32
X2	...	...	...	...	19	170	170	170
XK	...	...	...	...	38	282	282	192
<i>Widal</i> —								
T.	...	...	...	...	48	375	187	110
A.	...	...	...	...	63	37	37	37
B.	...	...	...	...	143	66	72	85
T. "O"	...	...	...	...	0	0	0	0

Four other cases which were clinically typical of typhus with profuse rash, headache, delirium and insomnia, and polynuclear leucocytosis were also tested and gave practically identical reactions as regards the Weil-Felix test. This paper brings to light two interesting facts; the first is that mild cases of fever without rash or other classical symptom of typhus fever may give a positive Weil-

Felix reaction even in greater dilution than cases which are clinically true typhus; second that there are in India several serological varieties of typhus fever; in the present series 4 cases gave what might be described as a positive group reaction for X19, X2 and XK, whereas one case in which XK was agglutinated (up to a serum dilution of 1/10,000) gave negative reactions with X2 and X19.

The results of the Weil-Felix reaction and Widal reaction for one of these severe cases is given below for comparison.

	Day of Disease					
	4	8	12	16	20	25
<i>Weil-Felix</i> —						
“O”						
X19	17	17	145	170	192	85
X2	64	64	282	282	282	170
XK	73	183	192	322	322	250
<i>Widal</i> —						
T.	71	71	71	63	80	75
A.	19	38	48	64	64	64
B.	36	72	333	717	427	286
T. “O” ...	69	84	96	110	74	73

Concentrated “O” emulsions were used in all cases, so that these results can be relied upon; this is not always the case when one reads that cultures of *Proteus X* are subcultured many times in laboratories without any check on the appearance of “H” forms in the cultures. D. H.

SCHULZ (H. H.). **Clinical Experiences with Some Diseases giving a Positive Typhus Reaction.**—*South African Med. Jl.* 1935. Apr. 13. Vol. 9. No. 7. pp. 225-230. With 6 figs.

The author has noted that in his experience cases of fever which give a positive Weil-Felix reaction may be of very varied clinical appearances.

He divides these cases into three main types: 1. The pneumonic type. 2. Typhus type. Without definite lung symptoms, but with delirium and meningeal symptoms; the rash in these cases may be atypical and in some cases does not appear at all. 3. Muscular type. Without fever or rash; characterized by insomnia and headache and pain at the back of the neck. The muscles of the legs, arms and back are painful and weak and the gait spastic. D. H.

DENGUE AND SANDFLY FEVER.

MCCLAMROCH (J. M.) & VALLOTTON (J. Ralph). **Dengue Fever. Report of One Hundred Cases studied at Jackson Memorial Hospital during the Miami Epidemic, 1934.**—*Southern Med. Jl.* 1935. July. Vol. 28. No. 7. pp. 635-638. With 4 charts. [14 refs.]

In addition to the clinical study some experimental work was carried out. It was found that filtered serum from an active case

was infective for a volunteer. Blood used for transfusion, taken inadvertently during the incubation period of the disease, gave rise to a severe attack in the recipient. All experimental animals tested were found to be resistant. Attempts made to reinfect volunteers after an attack failed.

Rash was noted in 50 per cent. of the cases only and was maculopapular and situated on the chest, abdomen, neck and arms; enlarged cervical and epitrochlear glands were noted, there was a marked decrease in the number of the polynuclear cells of the blood and an increase in the lymphocytes. One case admitted as dengue with fever and abdominal pain was later diagnosed as appendicitis and operated on. A perforated appendix was found. As the author puts it "a stormy postoperative course followed, culminating in a lethal exodus." This case is interesting in view of the paper by SANNER & LOUMAIGNE which follows.

D. Harvey.

SANNER (L.) & LOUMAIGNE. A propos d'une forme clinique rare de la dengue et affections voisines. (Dengue like Fevers des auteurs anglais.) [**Concerning a Rare Clinical Type of Dengue and Allied Infections. Dengue-like Fevers.**—*Arch. Méd. et Pharm. Nav.* 1935. Apr.-May-June. Vol. 125. No. 2. pp. 297-301.]

As a rule in dengue pains are complained of all over the body and limbs but not in the abdomen. But in the 3 cases described in this paper abdominal pain was a marked symptom. There was rigidity of the muscles of the abdomen and tenderness; appendicitis was suspected and one of the cases was operated on, but the appendix was found to be healthy although the surrounding tissues and the appendix itself were oedematous.

D. H.

SHARP (William B.) & HOLLAR (Emory). **Immunity in Dengue Fever.**—*Amer. Jl. Trop. Med.* 1935. May. Vol. 15. No. 3. pp. 247-264. [62 refs.]

A review of the literature on the subject with observations on local epidemics of the disease in Galveston, Texas.

Judging from the widespread nature of epidemics of the disease when they occur in populations not previously exposed to infection there would appear to be no natural resistance in any race; resistance is acquired and is due to one or more previous attacks of the disease. In Galveston, Texas, for instance two-thirds of the population were attacked during the epidemic in 1922.

Freedom from attack during an epidemic is either due to immunity derived from a previous attack or to protection from mosquitoes by screening. Relapses and reinfections do occur but as a general rule there is protection for some considerable time, at least one year. It has been suggested that these reinfections may be due to different strains of virus; others suggest that reported second attacks of dengue may arise from mistakes in diagnosis. As compared with yellow fever, a disease with which dengue has often been confused, the immunity following an attack of dengue is neither universal nor permanent as it is following yellow fever.

Attacks of dengue fever do not protect against yellow nor vice versa, neither do the sera of dengue patients neutralize the yellow fever virus.

The sera of several people who were known to have had dengue previously were taken and were tested by the mouse protection test but there was no evidence whatever of any protection; some of these people had had very severe attacks of dengue and a diagnosis of yellow fever had been suggested. [See this *Bulletin*, 1931, Vol. 28, p. 718; 1932, Vol. 29, p. 14; 1933, Vol. 30, p. 408.] D. H.

MURRAY (A. J.). A Case of Paratyphoid "A" simulating Dengue.—*West African Med. Jl.* 1934 Oct. Vol. 8. No. 2. p. 15.

SHORTT (H. E.), POOLE (L. T.) & STEPHENS (E. D.). **Note on Some Experiments with Sandfly Fever Blood and Serum.**—*Indian Jl. Med. Res.* 1935. July. Vol. 23. No. 1. pp. 279–284. With 2 charts.

The authors refer to previous work by them on the same subject. The object of the present study was to see if men who had had sandfly fever the previous season could be reinfected in the following year.

Blood from 3 cases of sandfly fever was sent from Peshawar to Kasauli. These bloods were divided into two parts and one part was injected into a volunteer who had not previously been inoculated, the other part into an old volunteer who had had fever in the previous year. The results were 2 typical attacks in 2 new volunteers, 2 modified attacks in 2 old volunteers. One blood failed to infect either old or new. Serum sent from a case of sandfly fever was found to be infective but, if convalescent serum was first inoculated and then the virulent serum, no fever resulted; when tested later this volunteer did not develop fever. D. H.

SHORTT (H. E.), POOLE (L. T.) & STEPHENS (E. D.). Sandfly Fever on the Indian Frontier. A Preliminary Note on Some Laboratory Investigations. —*Jl. Roy Army Med. Corps* 1934. Dec Vol. 63. No. 6 pp. 361–367; & 1935. Jan Vol. 64 No. 1 pp. 17–24 With 5 charts. [10 refs.]

CARRION'S DISEASE.

ESCOMEL (E.). Localisation géographique de la maladie de Carrion ou *Verruga* du Pérou. [**Geographical Distribution of Carrion's Disease.**]—*Bull. Soc. Path. Exot.* 1935. June 12. Vol. 28. No. 6. pp. 405–407.

This disease is found only in Peru, and in that country it is confined to certain valleys and ravines where special vegetation and sandflies exist.

Carrion's disease commences at 2,000 feet and ceases at 8,000 feet. The particular plants are lactatious cactus plants such as euphorbia and the sandflies are *Phlebotomus* Noguchi and *Phlebotomus verrucanus*. It is suggested that these plants are the sources of food and of virus to the fly. Certain investigators have found Bartonella in the latex of these plants. It is suggested that clearing of these plants from the valleys and ravines would be a method of prevention of the disease. D. Harvey.

RELAPSING FEVER AND OTHER SPIROCHAETOSSES.

CUNNINGHAM (J.) & FRASER (A. G. L.). **Further Observations on Indian Relapsing Fever. Part II. The Serology of Relapsing Fever in Human Beings.**—*Indian Jl. Med. Res.* 1935. Apr. Vol. 22. No. 4. pp. 595–616. With 9 charts. [33 refs.]

This article is a continuation of the authors' observations on the serology of Indian relapsing fever [see this *Bulletin*, 1934, Vol. 31, p. 847] and shows that the results previously obtained in experimental animals agree with those derived from the study of human infections.

The various types of *Spirochaeta carteri* isolated from louse-borne epidemics of relapsing fever in North and South India were found to be identical.

The following human sera were tested against types A, B and C:—

- (a) Samples taken from 132 cases obtained from an epidemic of the disease in the Nilgiri Hills in the Madras Presidency in 1924.
- (b) Eighteen samples from three sporadic outbreaks occurring in the Punjab—Multan, Hazro and Dera Ghazi Khan.
- (c) Twenty-nine samples from three areas in the North-West Frontier—The Kurram Valley, Drosh (near Chitral) and Quetta.

Most of the sera were found to belong to types A and B, and the antibody formation in these human cases followed the same course as that already described in experimental animals. Most of the sera derived from patients on the North-West Frontier failed to react with any of the louse-borne types of spirochaetes. It is possible that there may be some serological affinity between the spirochaetes causing the louse-borne type of relapsing fever and the tick-borne variety occurring in the North-West Frontier, but its extent is doubtful. Where reactions did occur, however, the C type was the one most frequently involved.

Sera obtained from both types of relapsing fever in India, failed to agglutinate three strains of spirochaetes, including two European strains of *S. recurrentis*, and one of *S. duttoni*. *E. Hindle.*

GILLESPIE (James O.). **Relapsing Fever in the United States.**—*Jl. Amer. Med. Assoc.* 1935. May 25. Vol. 104. No. 21. pp. 1878–1881. With 1 chart. [14 refs.]

A general account of the subject with the object of calling the attention of physicians to the features of a disease which is probably endemic throughout the entire Southern half of the United States, wherever ticks of the genus *Ornithodoros* find their habitat. *E. H.*

ANDERSON (Charles). Sur la présence d'*O. erraticus* infecté par *Sp. hispanicum* dans la banlieue de Tunis. [The Presence of *O. erraticus* infected with *S. hispanicum* in the Neighbourhood of Tunis.]—*Arch. Inst. Pasteur de Tunis.* 1935. June. Vol. 24. Nos. 3 & 4. pp. 483–492. With 3 charts.

The author has infected guineapigs with a strain of *S. hispanica* by inoculating them with a suspension of the contents of *O. erraticus* collected from burrows of *Mus decumanus* in the neighbourhood of Tunis.

The ticks refused to feed on experimental animals and therefore it was impossible to test whether their bite is infective. The spirochaete was shown to belong to the *hispanica* group by means of cross

immunity tests and as it was shown to be pathogenic to monkeys, *M. cynomolgus*, it is probably infective to man. Attempts to transmit the infection by means of *X. cheopis*, *Haematopinus suis*, *Gyropus gracilis* and *Rhipicephalus sanguineus* all gave negative results.

This discovery of infected *O. erraticus* in North Tunis fills one of the gaps in the distribution of Spanish African relapsing fever in North Africa. E. H.

COLAS-BELCOUR (J.). Evolution post-embryonnaire et mues de l'*Ornithodoros erraticus*. [**The Post-Embryonic Development and Moults of *O. erraticus*.**—*Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 604-606.

At temperatures of 28° and 32°C., with a relative humidity of 90 per cent., the number of nymphal stages was found to vary from 3 to 5. Third stage nymphs when moulting may give rise to adults, both male and female, or to 4th stage nymphs; the latter when moulting generally give rise to females, but exceptionally to males, or even to 5th stage nymphs. These invariably gave rise to females at the moult; 6th stage nymphs were never observed. E. H.

WHEELER (C. M.), HERMS (W. B.) & MEYER (K. F.). **A New Tick Vector of Relapsing Fever in California.**—*Proc. Soc. Experim. Biol. & Med.* 1935. May. Vol. 32. No. 8. pp. 1290-1292.

A demonstration of the transmission of relapsing fever in California by a new species of *Ornithodoros*, *O. hermsi*, collected from near Lake Tahoe, Big Bear Lake, and various other localities in San Bernardino, Eldorado and Placer Counties, California, at elevations ranging from 5,000 to 8,000 feet.

The ticks were found to be naturally infected with the Californian strain of *S. recurrentis* and susceptible animals (mice or monkeys) on which these ticks were fed showed spirochaetes in the blood after various incubation periods. E. H.

TOKURA (Noboru). Experimentelle Studien ueber die sogenannte Gehirn- und Organpersistenz der *Spirochaeta recurrentis* Duttoni unter dem Einfluss vom Alkoholismus. [**Experimental Studies on the Persistence of So-called Brain- and Organ-Infections of *Spirochaeta recurrentis* under the Effect of Alcohol.**—Reprinted from *Acta Dermat.* 1933. Vol. 21. No. 1-2. pp. 1-27. With 4 coloured figs. on 1 plate. [37 refs.]

The author has studied the behaviour of a strain of *S. duttoni* in two varieties of mice. One of these varieties known as the "T-mice," had a body-weight of approximately 15 gm. and was resistant against the infection (mortality about 16 per cent.), whilst the other variety, the "F-mice," had a body-weight of about 10 gm. and was much more susceptible, with a mortality of about 84 per cent.

One hundred and twenty T-mice were given daily doses of 0.3 cc. of 15 per cent. alcohol intraperitoneally, and after 10 days' treatment were inoculated intraperitoneally with a strain of *S. duttoni*; 120 F-mice were kept as controls and inoculated without being exposed to the effects of alcohol.

Five mice of each group were killed daily and examined for infectivity and also microscopically, especially the brain, liver, spleen and kidney.

The results are given in detail and support the view advanced by the author that residual spirochaetes remain in the blood. Even at the height of the infection it was very rare to find them in the brain tissue, but they might be found in large numbers in the capillaries, not only of the brain, but also of the liver, kidney, etc. These organs were also found to remain infective after the disappearance of the infection from the circulating blood. The spirochaetes are considered to persist in blood islands of the smaller capillaries, resulting from thrombus formation.

The mice exposed to alcohol were found to show blood infection at least 10 days longer than the control mice, and the infectivity of the brain and organs persisted about 10–15 days longer than in the controls. This, however, is not the result of any nerve poisoning as suggested by SEMZOVA [see this *Bulletin*, 1931, Vol. 28, p. 735], since there is no evidence that this spirochaete possesses any neuro-tropic affinities.

E. H.

VON JANCsó (N.) & NOVÁK (E.). Mikrobiologische Grundlagen der chemotherapeutischen Wirkung. III. Mitteilung: Die Bindung chemotherapeutisch verabreichter Goldverbindungen durch verschiedene Arten von Rekurrensspirochäten. [**The Microbiological Basis of Chemotherapeutic Action. Part III. The Combination of Therapeutically Administered Gold Compounds with Various Species of Relapsing Fever Spirochaete.**]*—Zent. f. Bakt.* I. Abt. Orig. 1935. June 14. Vol. 134. No. 3/4. pp. 159–169. [12 refs.]

Rats and mice infected respectively with strains of *Spirochaeta recurrentis* and *S. usbekistanica* were treated with various gold compounds and the spirochaetes subsequently examined for the presence of combined gold using the microscopic methods developed by the authors [see this *Bulletin*, 1935, Vol. 32, p. 596].

The authors' strain of *S. recurrentis* showed a very marked tendency to take up gold from such diverse compounds as triphal, krysolgan, solganal A and B, and potassium gold cyanide. The union of the gold compounds with the parasite was reversible, however, and by repeated washing of the spirochaetes with fresh serum the gold could be removed.

In the case of *S. usbekistanica* the tendency to take up gold was very slight, for spirochaetes from infected rats treated with maximum doses of either solganal A or B gave negative gold reactions after ultracrystallization, showing that the organisms were impervious to these gold compounds. Since the bodies of these spirochaetes contained no gold the only possibility is that the gold compound is attached to the surface of the organism, perhaps by a kind of monomolecular and reversible adsorption process which could not be detected by the methods employed. The results are all the more difficult to understand since infections of *S. usbekistanica* are more susceptible to treatment with gold preparations than infections of *S. recurrentis*. The reversibility of the reaction suggests that the fixation of the gold is not by

means of chemo-receptors but is rather of the nature of an adsorption phenomenon.

Discussing these results it is pointed out that chemotherapeutic action, in the strict sense of the word, may occur without any parasitotropic fixation. The distinction, however, between localization of medicament in the body of the parasite or only on the surface, is not very great, although theoretically the latter might be interpreted as a case in which the drug acts only through the defence mechanism of the host. In the authors' opinion, the view that the chemotherapeutic treatment of spirochaetal infections depends on the activation of the natural defence mechanism of the host, is founded on insufficient experimental evidence. E. H.

LEVADITI (C.) & DEUTSCH (V.). Action du rayonnement total de la lampe à mercure sur le virus récurrentiel. [**The Action of the Total Rays from a Mercury Lamp on the Virus of Relapsing Fever.**]*—C. R. Soc. Biol.* 1935. Vol. 119. No. 22. pp. 679–681.

A note on the different susceptibilities of various stages of relapsing fever spirochaetes to the total rays from a 500 watt mercury lamp. The ordinary spiral forms occurring in the blood of infected mice were found to require an exposure of about 20 minutes at distances of 15 to 38 cm. in order to destroy their virulence; whilst the invisible phase, occurring in the central nervous system of mice, including residual brain infections up to 57 days after the initial infection, and also the brains of mice killed whilst spirochaetes were still present in the blood, were both found to be very susceptible to the rays, being killed after exposures of 30 and 60 seconds of irradiation.

[It is difficult to understand how an emulsion of the central nervous system of a mouse containing spirochaetes in its blood, could fail to include some of the ordinary blood forms (*état végétatif*) which are stated to be resistant to the action of rays. Consequently the inactivation of such an emulsion by exposures of only 30 and 60 seconds instead of the much longer periods required by infected blood, suggests that the nature of the suspension fluid may have influenced the results.]

E. H.

MARCHOUX (E.), CHORINE (V.) & KOECHLIN (D.). Infection et immunité conférée par les spirochètes des poules en cultures artificielles. [**Infection and Immunity conferred by Fowl Spirochaetes in Artificial Cultures.**]*—C. R. Soc. Biol.* 1935. Vol. 119. No. 27. pp. 1280–1281.

The authors have tested the results of inoculating fowls with various numbers of fowl spirochaetes that had been isolated for 6 months; 48 hour cultures were invariably used and the number of spirochaetes in the suspension estimated by means of a haemocytometer.

Seven fowls were inoculated respectively with doses of 50,000, 10,000, 5,000, 3,000, 1,000, 500 and 100 culture spirochaetes. Inoculation of 5,000 or more produced typical infections; the two fowls inoculated with 3,000 and 1,000 developed immunity without any signs of infection, although the one receiving the higher dose showed

a rise in temperature from the 3rd to the 9th day ; whilst those inoculated with fewer than 1,000 spirochaetes were neither infected nor developed any immunity. E. H.

SCHARRER (Berta). Ueber die Feststellung von Dickenunterschieden an lebenden mikroskopischen Objekten, dargelegt am Beispiel der Unterscheidung von Hühner- und Rekurrensspirochäten. [**The Determination of the Thickness of Living Microscopic Objects, based on the Examination of Fowl and Relapsing Fever Spirochaetes.**]—*Arch. f. Protistenk.* 1935. Vol. 85. No. 1. pp. 87-99. With 3 figs. [23 refs.]

The author finds that it is possible to distinguish three degrees of thickness in spirochaetes by the use of different types of condenser. When a film of living *Spirochaeta recurrentis* is examined under the microscope, using e.g. a Zeiss X-apochromatic objective (x60) and an ocular x10 or x15, if the film is illuminated by means of a Cardioid condenser with a high numerical aperture (e.g. a Siedentopf Cardioid condenser), the spirochaetes show a curious optical phenomenon, each appearing as two parallel bright lines separated by a dark line.

If one uses a dry condenser, however, the spirochaetes lose this double contour and appear as single bright lines. In addition to *S. recurrentis* (European strain), five other strains of relapsing fever (*hispanica*, *usbekistanica*, *duttoni*, *angola* and *crocidurae*) gave similar results, also a strain of *S. novyi*. On the other hand, two strains of the recently created *S. turicatae* [see this *Bulletin*, 1934, Vol. 31, p. 86] showed very indistinct doubling of the contour, indicating that they were more slender than *S. novyi*.

When *S. gallinarum* is similarly examined the spirochaetes appear only as single bright lines, there being no suspicion of any double contours. Spiral organisms thicker than *S. recurrentis*, such as *Spirillum rubrum* Esmarch, show a double contour even when examined with a dry condenser.

No spirochaetes, except the relapsing fever group, were found to show the two appearances with the two types of condenser, so this furnishes a simple and reliable method of determining the approximate thickness of fine objects under the dark ground. E. H.

RAT-BITE FEVER.

SCHINZEL (Alfred). Ueber die bei einem Fall von Rattenbisskrankheit in Rostock 1931 als Erreger nachgewiesenen Spirillen (*Sp. minus*). [**The Demonstration of Spirilla (*S. minus*) from a Case of Rat-Bite Fever in Rostock, in 1931.**]—*Zent. f. Bakt.* I. Abt. Orig. 1935. July 23. Vol. 134. No. 5/6. pp. 302-305. With 2 figs.

The description of a typical case of the disease in a child bitten on the hands and arms by a rat. The symptoms developed 18 days later and spirilla were isolated from the blood and lymph glands and the infection transmitted to mice, rats and guineapigs. The patient's blood gave a positive Wassermann reaction [with syphilitic liver extract] and infected guineapigs also gave positive reactions with

syphilitic antigens and complement fixation with extracts of the organs of mice infected with *S. minus*. The serum of infected mice did not show the development of any antibodies against the parasite. According to the author this is the first case of rat-bite fever recorded in Germany in which the causative agent has been isolated.

E. Hindle.

OZEKI (Yaichiro). Ueber die durch die *Spirochaeta morsus muris* erzeugte Veränderung des Augenlides bei Maus. Anhang: Ueber den Haarausfall bei Maus durch *Spirochaeta morsus muris*. [**The Changes produced by *Spirochaeta morsus muris* in the Eye-lids of Mice. Appendix: The Loss of Hair in Mice caused by *S. m. muris*.**—*Japanese Jl. Dermat. & Urol.* 1935. May. Vol. 37. No. 5. [In Japanese pp. 615–638. With 21 figs. (3 coloured on 1 plate). [47 refs.] German summary pp. 109–112.]

Animals infected with rat-bite fever frequently show changes in the skin surrounding such openings as the eyes, mouth, anus, etc., and the author has studied this phenomenon in the case of the eyelids of mice. The changes developed at varying intervals after the inoculation; 28 days in 4.9 per cent.; 33 days in 18.5; 38 days in 25; 52 days in 27; and 63 days in 19.2 per cent. of the cases.

The spirilla were found to invade the skin about 14 days after the inoculation and to be especially abundant in the subcutaneous vessels and corium. The numbers of parasites increase and this is accompanied by marked cellular infiltration, which interferes with the general circulation, including that of the hair follicles, with the resulting loss of hair. About 40 to 50 days after inoculation the mouse generally develops an immunity and the spirilla disappear, but the cellular infiltration persists for some time afterwards.

E. H.

LEPTOSPIROSIS.

KOTORII (Saigo). Zur Klinik der sogenannten "Hasamiyami." (Weil-ähnliche endemische Krankheit.) [**The Clinics of So-called Hasamiyami. An Endemic Disease of the Weil Type.**—*Klin. Woch.* 1935. Aug. 10. Vol. 14. No. 32. pp. 1147–1149.

An account of Hasami fever, an endemic disease of the Weil type, occurring in the Hasami district, near Nagasaki, based on the study of 418 cases treated in the author's private clinic between 1903 and 1934. The disease is identical with Akiyami and Autumn fever, the aetiological agent being *Spirochaeta autumnalis*.

The author gives details showing that nearly all the cases of the disease occur in the autumn months of August, September and October. The general symptoms are sudden fever with rigors, severe headache, muscle pains and digestive disturbances. The most important characteristics are inflammation of the conjunctiva and of the throat, jaundice, subcutaneous haemorrhages, swelling of the lymph glands, albuminuria and leucocytosis.

E. Hindle.

KANEKO (Kôkichi); KOTORII (Saigo); AOKI (Yoshio); MORIMOTO (Tsutomu). 'Weitere Studien ueber die "Hasamiyami." I. Statistische Betrachtungen der im Distrikt Hasami gefangenen, spirochätenträgenden Feldratten. [Further Studies on "Hasamiyami." I. A Statistical Consideration of the Wild Rodents carrying Spirochaetes in the Hasami District.] [KANEKO, KOTORII & AOKI]. *Ztschr. f. Hyg. u. Infektionskr.* 1935. July 18. Vol. 117. No. 2. pp. 202-207. With 3 figs. II. Vergleichende Untersuchungen ueber die Methoden zum Nachweis des Erregers von "Hasamiyami" (*Spirochaeta autumnalis*) im Rattenkörper. [II. A Comparative Investigation of the Methods of finding the Causative Agent of "Hasamiyami" (*S. autumnalis*) in the Body of the Rodent.] [AOKI, KANEKO & MORIMOTO].—*Ibid.* pp. 208-215. [22 refs.]

I. The authors have examined 1,930 rodents captured in the Hasami District between July, 1932, and September, 1933. About 11 per cent. were found to be carrying a spirochaete belonging to the strain Akiyami A. (= *Sp. autumnalis*). The occurrence of the spirochaetes in the four species examined is shown in the following table:—

Species of rodent	No. examined	No. positive	Percentage	Sex	Percentage
<i>Rattus n. norvegicus</i>	444	0	0	—	—
<i>R. rattus alexandrinus</i>	38	0	0	—	—
<i>Apodemus speciosus</i>	1,426	209	14.7	♂ 137	16.7
<i>speciosus</i> ...				♀ 72	11.8
<i>Microtus montebelli</i> ...	22	1	4.5	♂ 0	
				♀ 1	8.3
TOTAL ...	1,930	210	10.9	♂ 137	♂ 13.1
				♀ 73	♀ 8.3

A total of 298 rodents collected in houses in the same district were also examined, but were uniformly negative. They belonged to three species, *Rattus norvegicus norvegicus*, *R. rattus alexandrinus* and *Suncus caeruleus* var. *riutsuanus*.

From these results it would seem that the field mouse *Apodemus speciosus* is by far the most important carrier of the infection and this view is supported by other evidence. The spread of the infection amongst the captured rodents was strikingly shown by the examination of animals that had been kept together in cages for periods of 10, 20 and 30 days respectively, which showed percentage infections of 8.0, 15.1 and 45.5. The influence of age is shown in a curve giving the incidence of infection corresponding to body-weight, from which it appears that the percentage of infected animals, both males and females, rises until they are full grown, with a body-weight of 51-58 gm., and falls very suddenly in animals above this weight. The spirochaetes occur mainly in the kidney and urine, only one in ten of the infected animals showing a positive liver.

II. The authors examined 50 *Apodemus speciosus* from the Hasami district for spirochaetes using various methods in order to determine

which was the best. Their results are given in the following table in which the figures indicate the number of positive findings out of the 50 examined :—

Microscopical methods			Guineapig inoculation	Culture method	Immunity reaction	
Dark ground	Stained Mùhl-pfordt-Ruge	Stained Levaditi			Agglutination	Adhesion
14=28%	12=24%	10=20%	16=32%	20=40%	18=36%	43=86%

The culture method seems to give the best results but it is necessary to have fresh material.

The results of the agglutination tests did not always agree with those obtained by culture, for 7 mice contained spirochaetes and gave negative agglutination tests, whilst 5 mice were serologically positive, but gave negative cultures. It is probable that in one group the infections were too recent for the development of antibodies, whilst in the other group the antibodies had persisted in the blood after the disappearance of the infection. The adhesion test was found to be very unreliable, giving positive reactions in a large number of cases not only with the strain under examination, but also with *S. icterohaemorrhagiae*, *S. hebdomadis*, another strain of *S. autumnalis*, and also with the water spirochaete, *S. biflexa*. E. H.

HASLÉ (G.), TOULLEC (F.) & VAUCEL (M.). Spirochétose ictérique au Tonkin. [**Spirochaetal Jaundice in Tonkin.**—*Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 551–553.]

A record of three cases of Weil's disease, two European and one native, occurring during September, 1934, at Hanoi.

One case showed meningitic symptoms and general septicaemia of *Bact. coli*, and died after 18 days. A guineapig inoculated with cerebrospinal fluid from this case, showed a typical infection with *S. icterohaemorrhagiae*. The other two cases were benign, but all three showed spirochaetes in the urine after the 10th day of illness. The inoculation of the centrifuged deposit from these urines, however, failed to infect guineapigs. Blood examinations of the two survivors only once showed the presence of immunisins, but both gave strongly positive sero-agglutination reaction.

Out of 142 local rats examined, only four were found to be infected with *S. icterohaemorrhagiae*. E. H.

MARCHESI (Franco). **The Spirochaeta of Infective Haemorrhagic Jaundice found in Rats in Rome.**—*Jl. Trop. Med. & Hyg.* 1935. Sept. 2. Vol. 38. No. 17. pp. 213–214. [22 refs.]

The author isolated three strains of *Spirochaeta icterohaemorrhagiae* from rats caught in Roman sewers. Inoculated into guineapigs the spirochaete produced typical symptoms of Weil's disease. The organisms were found to be capable of living up to seven days in filtered Tiber water, and therefore there is danger of the transmission of the disease from rats to man by means of the river waters. E. H.

UHLENHUTH & ZIMMERMANN. Zur Epidemiologie und Therapie der Weilschen Krankheit. [**The Epidemiology and Treatment of Weil's Disease.**]*—Zent. f. Bakt.* I. Abt. Orig. 1935. Vol. 135. No. 1/3. Beiheft pp. 151*–154*.

A general account of the subject.

With reference to the occurrence of the disease in dogs up to the present the authors have examined the sera of 67 individuals and found that 15 per cent. gave positive reactions against the ordinary strain of *S. icterohaemorrhagiae*. In addition to this strain, dogs may also be infected with the *canicola* strain discovered by SCHÜFFNER [see this *Bulletin*, 1934, Vol. 31, p. 853] and this type also may be infective to man.

The use of either convalescent serum, rabbit anti-serum, or bismuth compounds is recommended for treatment. E. H.

SPRUE.

REED (Alfred C.) & JOHNSTONE (Herbert G.). **A Clinical Study of Intestinal Fungi.**—*Amer. Jl. Trop. Med.* 1935. Mar. Vol. 15. No. 2. pp. 155–174. [11 refs.]

In spite of, or perhaps we may say because of, the negative findings this article is of considerable importance. The authors have examined by cultivation the stools of 50 patients suffering from various diseases to determine the nature of any fungi present and to establish, if possible, the relation of the fungus to the disease whether as cause or as secondary invader and also their pathogenic relationship.

Of the fifty, 24 had no fungi; 24 showed evidence of amoebiasis, 15 had chronic diarrhoea, 7 were cases of sprue. It is strange to find how evenly divided were those with and those without fungi. Thus of the 24 with amoebiasis 12 were positive and 12 negative; of the 15 with chronic diarrhoea, 7 were positive, 8 negative; of the 7 sprue patients 4 were positive. Among the four positive sprue cases Type III *Monilia*, *M. candida*, was found in three and a *Torula* in the other. Country of previous residence seemed to have little if any influence. Thirteen had lived in California, 6 were positive, 7 negative; 13 had visited or lived in Europe, 7 were positive, 6 negative; 15 had lived in the Far East, their respective figures were 8 and 7; 25 had lived in the United States, 13 were positive. It was only in the group of 10 who had lived in Central or South America that positives preponderated, 8 to 2 negative.

Some type of *Monilia* was the fungus most often isolated. The authors come to the conclusion that in no case were they convinced that there was any pathogenic relationship between the fungus and the disease; it may have modified the symptomatology but, though possible, this is difficult to prove. H. H. S.

MACKIE (Thomas T.) & POUND (Robert E.). **Changes in the Gastro-Intestinal Tract in Deficiency States with Special Reference to the Small Intestine: a Roentgenologic and Clinical Study of Forty Cases.**—*Jl. Amer. Med. Assoc.* 1935. Feb. 23. Vol. 104. No. 8. pp. 613–618. With 8 figs. [10 refs.]

Defective absorption is an outstanding feature in sprue and may affect the development of the deficiency factors of this disease. The authors have observed signs of advanced deficiency disease in several cases of ulcerative colitis, such as the affections of the tongue and buccal mucosa (as in sprue, pellagra and pernicious anaemia), the skin changes (as in pellagra), oedema and reduction of blood calcium, etc. The association of these deficiency states with chronic ulcerative colitis has led the authors to think that they may be aetiologically related, while too rapid passage of food or abnormalities of the small intestine would lead to defective absorption.

They have studied radiologically, after a barium meal, 37 cases of chronic ulcerative colitis and three of sprue. Nine of the former gave good evidence of infection by some strain of *Bact. dysenteriae* and six others agglutinated stock strains to diagnostic titre. From their observations of the progress of the barium meal the authors deduce "varying degrees of oedema of the mucosa, derangement of the normal motor function and abnormal variations in tone of the intestinal musculature." The pathological conditions at the base of these

changes are not definite. Tissues were obtained from four of the cases but no inference of any value could be made from them. There were, however, marked similarities in the roentgen changes as observed in the colitis and the sprue cases, although in two of the latter the disease was quiescent at the time. The authors note, however, that "it is impossible at the present time to state whether the small intestine changes are a factor in the production of the deficiency state or the result of such states." [One of the three cases of sprue was noted in this *Bulletin*, 1935, Vol. 32, p. 44.]

H. H. S.

MACKIE (T. T.), MILLER (D. K.) & RHOADS (C. P.). **Sprue : Roentgenologic Changes in the Small Intestine.**—*Amer. Jl. Trop. Med.* 1935. Sept. Vol. 15. No. 5. pp. 571-589. With 4 figs. [14 refs.]

Recent work on sprue tends to favour the theory that insufficient intake of food, or defective absorption, or inadequate utilization of it, or a combination of these takes part in the aetiology or pathogeny of the condition. The symptoms of sprue, the stomatitis, the diarrhoea, the anaemia, not infrequently improve greatly on the parenteral administration of liver extract, when oral administration fails. This is strongly suggestive of malabsorption of the extract, and by parity of reasoning lack of absorption of certain food essentials.

The authors give in the letterpress of their article and in tabular form the results of X-ray examination immediately after and at half-hourly or hourly intervals after 4-oz. barium meals taken by 17 sprue patients. They noted the calibre variation of the intestine, its segmentation and "pocketing," the time taken for the meal to reach the caecum, and the barium residue in the small intestine. They found that the outline was often abnormal and that localized segments filled and formed pockets like diverticula, while in the lower ileum the outline might be straightened "suggesting lack of pliability of the [intestinal] wall." They found no evidence, radiographically, of ulceration. Five of the patients were similarly examined at intervals when improvement was taking place following treatment, and the changes detailed were observed to be less marked.

CASTLE, HEATH and STRAUSS have recorded a lack of the gastric anti-anaemic principle, and abnormal states of the intestine have, as is well known, been found in experimental avitaminosis. Although the findings mentioned above seem quite definite by X-rays, it is not yet possible to gauge their importance in the pathogeny of sprue, for there is no definite proof post-mortem of any characteristic lesions. But we may say that this very absence of local reaction, histologically, is evidence against the local infection theory while consistent with that of defective absorption. Details of the five patients re-examined are given. The authors sum up their conclusions in the following words :—

" 1. Characteristic changes in the small intestine have been demonstrated by X-ray in seventeen cases of sprue.

" 2. Similar changes have been observed in other conditions exhibiting clinical evidence of multiple deficiency states.

" 3. The intensity and extent of the abnormalities in the small intestine vary directly with the severity of the clinical picture in sprue, and they regress under specific therapy.

" 4. It is suggested that they may play a part in the defective absorption or utilization of essential food factors."

H. H. S.

PILLAI (M. J. S.) & MURTHI (K. N.). **Further Observations on the Radiological and General Findings in Sprue.**—*Calcutta Med. Jl.* 1935. Oct. Vol. 30. No. 4. pp. 225-230.

In 1931 the authors published a paper on Radiological Signs in Sprue [see this *Bulletin*, 1932, Vol. 29, p. 8] and now report other cases examined in the same way. Of 14 cases 8 showed evidence of diverticulitis of the large intestine while the upper part of the alimentary tract was free of inflammation, *i.e.* what they regard as the ascending type. The remainder of the paper is concerned with discussion, largely hypothetical, on the way in which the condition and associated lesions may be set up, by endocrine or toxic action, but since there has not yet been an opportunity to verify these suspicions by autopsy there is no need at present to consider them more fully. H. H. S.

NICHOLLS (Lucius). **Sprue and Vitamin Deficiency.**—*Ceylon Jl. Sci.* (Sect. D. Med. Sci.). 1934. Dec. 8. Vol. 3. Pt. 3. pp. 173-176.

The author's views on sprue are given in his summary of this paper :—

"The pathology and clinical course of sprue are those of a deficiency disease. The deficiency is not in the diet, but is due to various causes producing a preliminary damage of the epithelium of the small intestine, which lowers its capacity to absorb the necessary vitamins, and thus may lead to impairment of the metabolic assimilation."

He believes that it is not the lack of vitamins, especially vitamin A, in the diet, but lack of absorption of it that is the prime cause or that a disordered metabolism may prevent the normal assimilation of vitamins after absorption. No fresh evidence is adduced and the theory leaves unexplained the peculiar geographical distribution of the disease and, more important, the long latent period, 10 years or more, which may elapse after a person has left the tropics before symptoms appear, when during that interval he has been living under excellent conditions.

H. H. S.

VAN STEENIS (P. B.). **Tropische spruw, zwangerschap en eczeem. [Sprue. Eczema as a Complication of Sprue in Pregnancy.]**—*Nederl. Tijdschr. v. Geneesk.* 1935. May 4. Vol. 79. No. 18. pp. 2062-2072. [18 refs.] English summary.

The summary runs thus :—

"Among 38 cases of sprue in women, 33 of whom were married and in the age-period of child-bearing, 12 occurred during pregnancy (36 pCt.). Eight of these were primary cases of sprue in pregnancy, 4 recurrences of pre-existing sprue during pregnancy. The symptoms appeared mainly after the 6th month; after delivery in general recovery or marked improvement set in.

"Sprue of pregnancy does not differ materially from other cases in its symptoms. As a complication in 4 of the 12 cases eczema was noticed, appearing respectively in the 7th month, 8th month of pregnancy, 10 days respectively 2 months after delivery. In the first three patients it was much generalised on the trunk, extremities and genital area and subsided soon after delivery. Neither in sprue nor in pregnancy is eczema a common complication."

MULLER (P.). *Bepaling van de hoeveelheid vet in faeces. [Determination of the Fat Content of Faeces.]—Nederl. Tijdschr. v. Geneesk.* 1935. Aug. 17. Vol. 79. No. 33. pp. 3960-3962. English summary (6 lines).

Under the methods in customary use for determination of saponified and unsaponified fat in the faeces the specimen has to be dried as a preliminary. This is a tedious procedure and obviated by that described, in which acidified acetone is employed as the first extraction fluid. The acetone is then distilled off and the residue shaken with petroleum ether as the second extraction fluid. Thereafter the usual procedure of drying, weighing and titrating is followed. For actual details the original should be consulted. A table of results comparing the total fats and fatty acids by the acetone and the ether methods in several cases is given which shows that the two correspond very closely. *H. H. S.*

FAIRLEY (N. Hamilton). **Tropical Sprue and its Modern Treatment.**—*Brit. Med. Jl.* 1934. Dec. 29. pp. 1192-1194. With 1 chart.

This paper was read at the meeting of the Tropical Medicine Section of the British Medical Association held last year and sums up very clearly our present knowledge regarding the treatment of sprue, and the most recent views as to its aetiology. The chief laboratory findings and points of importance in differential diagnosis are stated with the authority of one who has made an intensive study of the subject. The author, after mentioning views on aetiology which are now of little more than historical interest—those of ASHFORD, ELDERS, and SCOTT—gives his opinion that “sprue arises as a functional breakdown in the gastro-intestine, and that any factor or factors depressing its secretory or absorptive function will predispose,” and he mentions malaria and dysentery as possible depressors of gastric secretion. This, of course, as the author would probably be the first to concede, does not clear up the vexed question of the aetiology of sprue, but merely throws the problem back and leaves unanswered the questions why this condition of depression of gastric secretion or alimentary function occurs to a small proportion only of persons subjected to similar conditions of environment and régime and why the onset of symptoms is sometimes delayed for years after removal from such environment.

Dr. Fairley gives details of the high protein, low fat, low carbohydrate diet or graded diets which have proved so successful in his hands and of the use of liver extract *per os* for the anaemia. He has rarely found it necessary to have recourse to the parenteral administration of liver.

He gives an example of a sprue patient who, after repeated attempts, failed to respond to liver therapy *per os*, but whose blood showed active and rapid regeneration after intramuscular injections (6 cc.) of campolon [a preparation of liver extract]. He does not omit to mention the need for care in diet and routine after cure to guard against relapse. *H. H. S.*

CASTLE (W. B.), RHOADS (C. P.), LAWSON (H. A.) & PAYNE (G. C.). **Etiology and Treatment of Sprue. Observations on Patients in Puerto Rico and Subsequent Experiments on Animals.**—*Arch. Intern. Med.* 1935. Oct. Vol. 56. No. 4. pp. 627-699. With 6 charts. [136 refs.]

This is a long paper dealing not only widely but also deeply with the subject. It is too full and too detailed for any abstract adequately

to do it justice and it should be read in the original by those interested. It would form an excellent chapter in a treatise on tropical medicine and with its 136 references omits little of real importance which has been written on sprue since HILLARY's classic appeared in the latter half of the eighteenth century. The authors take up in turn the history of sprue, the aetiology and clinical picture, describing and discussing the symptoms, the blood and marrow changes, the relations between sprue, pellagra and pernicious anaemia. [In the reviewer's opinion too much is made of possible relation and resemblance to pellagra; to those who have practised in the tropics the conditions are clinically so distinct that to insist on the few points of similarity tends rather to confuse the issue. Experimentally, in animals regulation of diet can result in "stomatitis, salivation, diarrhoea and, in some instances, dermatitis. . . . It appears to us, however, that if the cutaneous lesions are excepted the resemblance of these conditions to pellagra is no greater than their resemblance to sprue." Quite so, or even poisoning by mercury.] To treat seriously in these days the Monilia theory is but thrashing a dead horse. The authors give an excellent account of the possible combination of the three factors in aetiology: extrinsic of dietetic origin, intrinsic in the gastric secretion or the lack of them and defective absorption. The analogies between the anaemia of sprue and pernicious anaemia are well presented and the treatment, especially by liver, is considered at length.

The conclusions are best given in the authors' own words:—

"It is believed, therefore, that in sprue, as in pernicious anemia, there is involved the failure of a reaction between an extrinsic factor in the diet, associated in several substances with vitamin B₂ (G), and an intrinsic factor, present in the gastric contents of the normal person. In addition, difficulty with the absorption of substances from the intestinal tract resulting from this hematopoietic reaction is probably involved in certain instances of both diseases. In different patients with sprue the relative importance of these mechanisms is variable. Sprue with macrocytic anemia thus arises from the variable participation of three defects: of the extrinsic factor, of the intrinsic factor and of absorption. Dietary deficiency of iron, gastric acidity and intestinal impermeability may also decrease the normal intake of iron.

"By means of diets deficient in sources of the extrinsic factor or closely related substances, lingual and gastro-intestinal lesions, macrocytic anemia with megaloblastic bone marrow and degenerative lesions of the spinal cord have been produced in animals. These manifestations can be abolished by means of liver extract or the extrinsic factor. The gastric secretion of pigs fed appropriately defective diets loses its normal content of the intrinsic factor, and the liver becomes deficient in substances normally present and capable of producing increased formation of blood in cases of pernicious anemia. Therefore, the disease picture in animals may reasonably be regarded as analogous to that in patients with sprue. Appropriate dietary defects in man may likewise initiate the physiologic disturbances of the alimentary tract subsequently involved in the production of sprue.

"The evidence for the primary etiologic relationship of yeastlike organisms to sprue is not convincingly supported by observations on animals or on man.

"The administration of adequate doses of liver extracts effective in pernicious anemia, especially by parenteral injection, is fundamental

in the treatment of sprue and its macrocytic anemia. The accessory use of iron is indicated for certain patients.

"It is emphasized that adequate doses of liver extract are as important in controlling the manifestations of the alimentary tract as in promoting the formation of blood in cases of sprue." *H. H. S.*

BROOKE (Gilbert E.). Tropical Aphthae, or Sprue, and its Treatment.—*Jl. Trop. Med. & Hyg.* 1935. Feb. 1. Vol. 38. No. 3. pp. 29–33.

This article starts with a fairly comprehensive summary of the theories which have been brought forward since the beginning of the century as regards the aetiology of sprue; this is followed by a few remarks on pathology, symptoms and treatment as gleaned from the literature.

The author makes yet another suggestion as to causation, namely a predisposition brought about by deficiency in vitamins A and G, and on the top of this an infection possibly conveyed by cockroaches—a sort of half-way house to the termite theory.

The author, who has himself suffered from sprue, ends with a detailed description of the diet which he has found suitable in his own case and which, with the magnanimity characteristic of dieticians in general and sprue subjects in particular, he here communicates for others to try. For the ingredients and modes of preparation of the food the original paper must be consulted; full details are given.

H. H. S.

VAN PRAAG (André). Données nouvelles sur la sprue nostras. [Non-Tropical Sprue].—*Bruxelles-Méd.* 1935. June 2. Vol. 15. No. 31. pp. 843–852. [15 refs.]

This forms an interesting addition to the growing list of cases of non-tropical sprue.

The patient was a woman of 32 years, unmarried, a dressmaker, who had enjoyed good health until two years before she consulted the author. She had never been outside Europe. Her symptoms were diarrhoea, with pale, bulky, frothy stools, starting at 5 or 6 a.m. and continuing at intervals during the morning. For 18 months she had had sore tongue and a burning sensation in the mouth. She had lost 20–25 kgm. in weight, and the abdominal distension "contrasted with the general wasting." The stools were characteristic, both macroscopically and microscopically. Blood examination gave red cells, 2,510,000, white 6,000 per cmm. Hb. 85 per cent., C.I. 1·7; Calcium 8·2 mgm. per cent. Chvostek's sign was present.

She was placed under a mixture of treatments which makes it difficult to gauge which was responsible for the improvement that followed. She was kept in bed, dieted with fruit alternating with milk and twice weekly the juice of 1 lb. of meat. Calcium was given by mouth, parathyrene by injection followed by "Pernaemon." With the exception of a slight relapse, due probably to diet indiscretion, progress was uneventful, and in 5 months she had gained 8 kgm. in weight, stools were reduced to two on rising, blood calcium was 9·3 per cent. and the patient left saying that she felt perfectly well.

H. H. S.

ENNEKING (J. A. M. J.). Een genezen geval van inheemsche spruw met spontane fracturen. [**A Cured Case of Home Sprue with Spontaneous Fractures.**]—*Nederl. Tijdschr. v. Geneesk.* 1935. June 29. Vol. 79. No. 26. pp. 3175–3185. With 2 figs. [21 refs.] English summary (7 lines).

The syndrome which comprises fat diarrhoea, hyper- or hypochromic anaemia, osteoporosis and tetany has, with increasing frequency, been described as non-tropical sprue. Such a case in a shoemaker of 59 years, who had never been in the tropics, is given in detail and is here briefly summarized :—

Symptomatology.—On admission in the autumn of 1933 the patient showed emaciation, with good appetite, symptoms of tetany which did not diminish on administration of calcium lactate, and diarrhoea, which was not influenced by diet. Stools 4 daily, voluminous, thinly pultaceous, offensive, yellow and fatty, becoming definitely sprue-like.

Examination.—Marked calcium deficiency in all bones as estimated by X-ray and fractures of the 4th, 5th, 6th and 7th ribs. Skin dry and slightly yellow, mucosae slightly anaemic, no icterus. Tongue neither glazed nor red originally, but later pain in, and vesiculation of, mouth and tongue. Blood pressure 105/70. Urine : trace of albumin, no glycosuria, no Bence-Jones protein, much urobilin, many hyaline and some granular and leucocyte casts. Temperature normal. Weight 41·2 kilogram., height 1·56 metres. Wassermann negative. A fractional test meal showed complete absence of hydrochloric acid and a total acidity of 5 to 7. The blood showed hyperchromic anaemia (erythrocytes 1,600,000. Hb 60–70), anisocytosis, poikilocytosis, slight polychromasia, many nucleated red cells (68 per 200 leucocytes), slight leucocytosis, normal differential count and increased sedimentation rate (1 hr. 34, 2 hrs. 72). Calcium content of the blood serum 4 to 5 mgm. per cent. and inorganic phosphorus content 2·25 mgm. per cent. On a diet which should have shown 100 mgm. calcium in the urine there was excreted only 25 mgm. Bilirubin content of the blood serum increased (0·006 mgm/cc.).

Treatment.—At first 200 gm. raw liver daily made up with salad and tomatoes ; 10 mgm. calc. lactate in wafer twice daily combined with 15 drops davitamon ; hydrochloric acid, pepsin and fat-poor diet with good result. Subsequently general ultraviolet irradiation and further improvement. Finally 5 drops davitamon once every 3 days, chalk powder 3 times daily and one injection of liver every 14 days.

Result.—In February 1935. Pain disappeared. Fractures healed. Still achlorhydria and no free hydrochloric acid. On subcutaneous injection of histamine there occurred abundant gastric secretion and 1 hr. later there was hydrochloric acidity of 62 and a total acidity of 75. Weight 52·5 kilogram. Urine had become normal. Stool once daily and appeared normal with only a little neutral and split fat (microscopically). Blood picture nearly normal. General condition excellent. Could walk for hours without any complaint. The calcium content of the blood had increased to 9·1 mgm. and the phosphorus to 3 mgm. per cent. [The constitution of davitamon is not stated.]

W. F. Harvey.

SNELL (Albert M.). Clinical Observations on Non-Tropical Sprue—*Southern Med. J.* 1935. June. Vol. 28. No. 6. pp. 516–520. [26 refs]

MINDLINE (J.) & ROSENHEIM (M. L.). **Duodenocolic Fistula simulating Idiopathic Steatorrhoea.**—*Lancet.* 1935. Oct. 5. pp. 764–767. [24 refs.]

The authors describe the case of a man of 43 years, who 24 years before had served in India and had had malaria but no other illness. He was admitted to hospital with fever (up to 102°F.) and was passing

pale, semisolid stools, which showed excess of fatty acids, but not of soaps or neutral fats. Blood count gave $4\frac{1}{2}$ million red cells, 9,200 white per cmm., Hb. 80 per cent., blood calcium normal. He left hospital with some improvement in a month, but returned 6 months later with low blood pressure, loss of weight (18 lbs.), pallor, distended abdomen, ascites and was passing 2-4 pale, bulky, pultaceous stools daily. The liver edge was palpable. The anaemia was more marked than at his previous admission to hospital; red cells $3\frac{1}{2}$ million of macrocytic type, white 13,000, haemoglobin 68 per cent., blood calcium still normal. He gave a history of "faecal vomiting." The diagnosis was thought to rest between idiopathic steatorrhoea [*i.e.*, non-tropical sprue], or abdominal tuberculosis or neoplasm. Ascites increased and recurred repeatedly after paracentesis. Operation was undertaken and a carcinoma of the hepatic flexure of the colon was found. The patient died and at autopsy a large growth of the flexure was observed to have ulcerated through to the duodenum. Other cases, in several points similar to this, are referred to by the authors [see also this *Bulletin*, 1930, Vol. 27, p. 1024; 1932, Vol. 29, p. 463].

H. H. S.

ROMINGER (E.) & BOMSKOV (C.). Untersuchungen an hyperchromen Anämien bei experimentell erzeugten sprueartigen Erkrankungen. [**Hyperchromic Anaemia in Sprue-like Conditions experimentally produced.**—*Klin. Woch.* 1935. Feb. 2. Vol. 14. No. 5. pp. 148-150.]

The authors claim to have brought about anaemia of the chlorotic type in young, growing white rats by feeding them with cows' milk, and of the pernicious type by feeding with goats' milk. The former they ascribe to deficiency in iron or copper since it is curable by exhibiting these metals; the latter, they maintain, is identical with pernicious anaemia in man because it is refractory to iron but susceptible to liver treatment.

The symptoms resulting from feeding the rats on goats' milk were: "fatty stools, pernicious anaemia, lipaemia and the nervous disturbances corresponding to the picture of sprue." The red cells were reduced to about a million [the normal for rats is not stated], the colour index was 1.3; there was definite leucopenia with relative lymphocytosis. Anisocytosis, poikilocytosis and polychromasia were marked and megaloblasts and normoblasts numerous. [It is not stated whether the anaemia was of the megalocytic type.] The lipaemia was marked and the blood sugar reduced by half. The "nervous symptoms" comprised muscular weakness, stiffness of limbs and even paralysis, with a "definite crab-like gait."

The authors call this symptom-complex "Rat sprue" and discuss its causation; whether it is parasitic, infective or toxic in origin or a deficiency disease, and they lean to the idea that it arises from absence or deficiency of the "anti-anaemic factor of vitamin B₁₂" and failure of adequate absorption from the intestine of the "blood regenerating factor," in the course of the fatty diarrhoea brought about by feeding with goats' milk. [The article contains too many suppositions, and sprue in man is not characterized by paralysis or a crab-like gait.]

H. H. S.

WEISE (W.). Sammelbericht ueber Sprue.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Oct. Vol. 39. No. 10. pp. 425-432. [Numerous refs.]

MISCELLANEOUS.

DE LANGEN (C. D.). **Geographical Pathology.**—Reprinted from *A Clinical Text-Book of Tropical Medicine*. pp. 479–513. 1935. Batavia-C.-Surabaya-Amsterdam. G. Kolff & Co.

This is an excerpt from a Text-Book of Tropical Medicine and aims at discussing the general diseases which are practically universal, pointing out the special features which characterize them when occurring in tropical countries. Geographical pathology is a most absorbing subject, worthy of a whole volume to itself, and cannot be adequately treated in a chapter of 35 pages. The order of treatment is arbitrary, *viz.* gastric conditions, ulcer and carcinoma, then liver diseases, cirrhosis, primary carcinoma and cholelithiasis, the anaemias and cardio-vascular disorders, tuberculosis, pneumonia, renal affections, glycosuria and diabetes, gout and specific fevers. The rarity of gastric ulcer in the tropics is noted; under the anaemias it is stated that macrocytic anaemia is “in no way akin to the anaemia of sprue or pernicious anaemia” and that “sprue is regarded as a typical tropical disease.” Sprue anaemia is of the macrocytic type and the differences should be noted between it and other forms if held to be “in no way akin.” Nothing is said of the so-called non-tropical sprue which should assuredly find a place in work on geographical pathology. The author’s experience of tuberculosis in the tropics differs from that of those practising in other parts of the tropics. Thus, he states that haemoptysis is a symptom which is present with extraordinary frequency and that it is severe and not unusually fatal. “These findings are confirmed from all other tropical lands,” he states. On the contrary SCOTT has noted among his series of Chinese in Hong Kong that he only found three deaths from haemoptysis, all adults, and that “no case was found among the far larger number of children” and he adds “It would seem that this condition does not occur in the ‘natural’ disease, only in the ‘modified’” and tuberculosis in the tropics is in his experience largely of the natural type as opposed to the modified. The remarks on the chief infective diseases, diphtheria, scarlet fever and measles consist of brief generalizations. It is nowhere stated that the author’s remarks apply only to Netherland India and if he is giving his experience of that country only he is taking a very limited view of so vast a subject as tropical geographical pathology.

H. H. S.

RADSMA (W.). Enkele physiologische verschillen tusschen Europeesche en inheemsche bevolkingsgroepen te Batavia. [**Physiological Differences between Europeans and the Indigenous Population of Batavia.**]—*Nederl. Tijdschr. v. Geneesk.* 1935. June 22. Vol. 79. No. 25. pp. 3066–3084. With 3 figs. [25 refs.] English summary.

The English summary is as follows:—

“In the first communication of this series we described some differences which have been found in the chemical composition of the blood and the acid-base equilibrium between different European and native groups of population in Batavia.

“Distinct differences were found especially between the poorer natives (servants and coolies) and the European population. The haemoglobin content, the content of cholesterol and other lipoids was lower with the

poorer natives than with the Europeans, while with the better situated natives (students) the content of lipoids in the blood was about the same as with the Europeans, the content of haemoglobin somewhat higher. The amount of non-protein nitrogen and of glucose was lower with the natives than with the Europeans.

"As for the acid-base equilibrium, a distinct difference proved to exist between the occurrence of morning-alkaliuria with Europeans and native servants. With Europeans morning-alkaliuria often occurred, with the servants practically never. The results of measurements in the 24-hours urine point to a more acidotic metabolism with the servants, caused by a relatively smaller amount of fixed bases in their food. With the students the results mostly lay between those with the servants and with the Europeans. The blood of the native servants proved to be more acid than that of the Europeans.

"In this second communication the probable causes of the differences are discussed."

McEWEN (O. R.). **Salt Loss as a Common Cause of Ill-Health in Hot Climates.** [Correspondence.]—*Lancet*. 1935. Apr. 27. p. 1015.

LANGDON-BROWN (W.). **Salt Loss as a Cause of Ill-Health.** [Correspondence.]—*Ibid.* May 4. p. 1069.

The loss of fluid by miners and stokers working at high temperatures and the relief of resulting symptoms by the drinking of saline fluid are well recognized. Col. McEwen believes that the ill-health and loss of efficiency in the white inhabitants of tropical regions in the hot season is due to the same cause, *viz.*, a loss of sodium chloride.

HUNT estimated the loss of fluid in the hot weather in India as 30 pints per diem. McEwen from experience in the Punjab and North West Frontier Province puts it at 12 pints with light exercise. If then the proportion of NaCl in the sweat is put as low as 0.3 per cent. (YAS KUNO) there would be lost in 12 pints "some 16 gm. a day [should not this be 21.6 gm. ?]." Adding 12 gm. passed daily in the urine, and 4 gm. as necessary for bodily metabolism, we have a total requirement of 32 gm., and if we take 15–20 gm. as the amount taken in food there is a deficit of some 12–17 gm. daily, which might be doubled in certain conditions. Many Europeans never feel well in the really hot weather, complaining of undue fatigue, lassitude, headache, sleeplessness and inability to concentrate. McEwen himself has reduced the incidence of these symptoms by increasing his intake of NaCl and he advises the drinking of physiological salt solution at full or lesser strength. Other means of increasing the salt intake are mentioned.

Sir W. Langdon-Brown refers to "functional hypo-adrenalism" as a severe form of the condition McEwen describes. In these cases cortical extract is prescribed but perhaps salt would do as well. In this type of case achlorhydria is found, which would be explained by salt deprivation.

A. G. B.

CULPIN (Millais). **Neurasthenia in the Tropics.**—Reprinted from *Practitioner*. 1935. Aug. Vol. 135. pp. 146–154.

After tracing briefly the history of the recognition of those conditions which later became known collectively as the psychoneuroses, the author gives reasons for suggesting that they would be better included under the designation "Benign psychoses" and that the word neurasthenia should disappear.

Having thus defined the subject of his article Millais Culpin then proceeds to show "that there is no specific condition attributable to the tropics"—no such thing as "tropical neurasthenia." He believes that the symptoms of the condition arising in the tropics differ in no way from those presented in the benign psychoses in Great Britain and other temperate countries and that both are due to the same psychogenic factors though some of the conditions associated with life in the tropics—"climate, conditions of service, worry and the like can pull the trigger" and precipitate the "nervous breakdown."

That a large number of persons are invalidated from the tropics with "neurasthenia" is well known. The point is made that among these are many who were the subjects of some neurotic or temperamental infirmity before going abroad and a certain number who had "actually availed themselves of the opportunity of going abroad as a flight from the strain of social life at home."

"The problem of reducing the incidence of 'tropical neurasthenia' is . . . not very different from similar problems at home." A study of individual cases would yield systematic information upon these cases and further inform us "what are the actual conditions that in specific cases have precipitated the breakdown," and "what kind of man tends towards breakdown."

Only thus armed, with a knowledge of all the factors involved and with the power to assess the qualities which may be expected to play a part in the production of breakdown, is the medical man able to advise properly upon candidates for tropical service. The same knowledge is essential in the medical officer abroad where recognition of the nature of these disorders and an informed investigation into individual cases would go far to reduce absenteeism from this cause.

H. S. Stannus.

CASTRONUOVO (Giovanni). Irritabilità, psicosi e neuropatie tropicali. [**Tropical Psychoses.**—*Riforma Med.* 1935. Aug. 3. Vol. 51. No. 31. pp. 1180-1182.]

This article is one of great interest, dealing briefly with various psychoses which are observable in warm climates. The information given is very condensed, but is one of the best summaries within the reviewer's knowledge. The author treats first with mere states of irritability and the milder psychoses, often denominated tropical neurasthenia, such as hypochondriacal nostalgia, abulia, Sudanitis, Biskritis, Punjab head, states of anxiety, and so forth (see this *Bulletin*, 1933, Vol. 30, p. 802). He then mentions those forms which occur with definite disease, *e.g.*, the psychoses of pellagra and passes on to speak in more detail of the graver forms such as *amok* with its hallucinations and tendency to homicide; *uas-uas* with its melancholic depression, palpitation, paraesthesiae in the form of pruritus, formication, and phobias, as met with in Tripolitania; *latah*, an imitative psychosis, commonest in Malaya and in Northern Africa; *koro*, in the Celebes, an anxiety state with a "castration phobia" which is intense (see the following abstract); *kubisagari*, the transient paralysis with vertigo, in Japan; it affects commonly the neck muscles and the name means "man with a falling neck." Other psychoses mentioned are transient apoplectic or syncopal attacks in the young, epileptiform convulsions and certain neuropathies described by

ALEXANDER & WU (*Chinese Medical Journal*, 1934) as associated with dysentery. The article should be consulted in the original by those interested in these nerve-states. H. H. S.

PALTHE (P. M. van Wulfften). Koro. Een eigenaardige angstneurose. [**Koro, a Peculiar Anxiety Neurosis.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1934. Dec. 25. Vol. 74. No. 26. pp. 1713-1720. With 4 figs. (2 on 1 plate).

SLOT (J. A.). Koro in Zuid-Celebes. [**Koro in South Celebes.**]—*Ibid.* 1935. May 14. Vol. 75. No. 10. pp. 811-820. With 2 figs. English summary.

PALTHE (P. M. van Wulfften). Aanvulling op het artikel "Koro, een eigenaardig angstneurose." [**Supplementary Note.**]—*Ibid.* pp. 836-837.

MULDER (J. G. A.). Over Koro. [**Koro.**]—*Ibid.* pp. 837-838.

The publication of the first of these articles brought out, in a subsequent number of the same journal, other accounts of the neurosis which is here described as Koro. This name, which signifies shrivelling, is, of course, native and is used by Macassars or Buginese (South Celebes). It is a well-known affection also among Chinese under the name Shook Jong and was first described by Blonk in 1895. The article in MENSE'S *Tropical Handbook* (1905) by Brero refers to it, and yet many practitioners in the tropics have never seen or heard of it. Blonk described it as an illness in which, at irregular intervals, the feeling arose that the penis was retracting into the abdomen. If then timely help was not forthcoming death followed. The condition is greatly feared. The sufferer in his anxiety takes the penis forcibly in the hand or, if not himself able to do so, is assisted by others. It may be days before the attack subsides and a Koro sufferer during the attack will not want to be left alone. Should it so happen that the attack comes on and help is not at hand the patient may tie the penis with string to the leg or he may have in readiness a double-bladed clasp instrument, called Li Teng Hok, which is ordinarily used by jewellers for weighing operations. After the attack is over the patient feels greatly exhausted.

In terms of native thought this tendency of the penis to retract indicates that the "Yin" principle, representing the female power dominates the "Yang" principle, which is the representative of all that is male. "Yang" and "Yin" stand for heaven and earth, sun and moon, day and night, heat and cold, life and death, positive and negative, strong and weak. In order that Yin disease shall be cured Yang medicine must be given. Little real explanation of the disease can be given by natives. It is found in a definite region, occurs in a definite people, is a generally recognized belief in a sickness which everyone fears, but the feared consequences of which no one has seen. The disease is there because it must be. Thus runs the argument for a primitive folk belief.

The sufferers are apparently neurotics, who get attacks of anxiety and constraint sensation. The anxiety arises out of sexual conflicts. In this we may see the conception of a "castration complex" according to FREUD. As already said the disease occurs among the Chinese and yet in China even at the present day castration is not a relic of antiquity. It is a reality as a mode of punishment and for the production of eunuchs. It may involve loss of the penis as

well as the testes. The reality too of the belief that destruction of the genitalia signifies destruction of life is evident among the inhabitants of the Celebes region by the use of the method in attempts at suicide not only as a regression phenomenon in schizophrenics but as a deliberate cold-blooded action.

The investigation then of the disease Koro is evidently one of psychological and ethnological importance. As factors which may excite the fear of an attack may be mentioned conditions of oedema of the lower abdomen, hernia, hydrocele, or elephantiasis of the scrotum. In these the gradual disappearance of the penis may be regarded as essential shrivelling.

The disease, as is evident from the accounts given, is not confined to men. It is known to occur also in women with identical symptoms. In women the bodily symptoms are of diminution of the genital labia and shrinkage of the breasts.

A complete insight into the cause of this sickness cannot, it is thought, be obtained except by a psychoanalysis, an analysis by one of allied cognate psyche, that is to say of a Macassar by a Macassar. For the present the general term of an anxiety neurosis seems to be the most useful appellation.

As regards treatment the sufferer and his friends will probably apply the recognized treatment by fixation of the penis until the attack be over, but one at least of the authors was able to effect a cure by the administration of allonal for the night, a strong bromide draught next day and persuasion that the consequences feared were impossible.

W. F. Harvey.

NAPIER (L. Everard) & GUPTA (C. R. Das). **Haematological Studies in Indians. Part I. Haemoglobin Estimation Methods. Part II. Normal Standards for a Bengal Town Population. Part III. Normal Standards for a Tea-Garden Coolie Population.**—*Indian Jl. Med. Res.* 1935. Apr. Vol. 22. No. 4. pp. 809–825. With 1 graph & 1 chart; July. Vol. 23. No. 1. pp. 305–309; 311–316.

This article is on a subject of the utmost importance in clinical medicine and in work of a research nature on the blood. The authors deplore the present unsatisfactory method of recording the haemoglobin content as a percentage of a shifting standard and state that the obviously scientific way is to record the content in grams per 100 cc. of blood. The present confusion is made greater by the fact that the "normal" [*i.e.* the average content of a large number of apparently healthy adult males] on which the percentage is based is different in different races and countries, *e.g.* the British differs from the American normal.

In the present article the authors discuss and point out the advantages, disadvantages and fallacies of the various methods usually employed for estimating the haemoglobin content of blood. They are all colorimetric, such as (1) comparison of undiluted blood with a graduated colour standard, as Tallqvist or Dare's methods; (2) comparison of blood diluted to a fixed percentage with a coloured glass-wedge standard; in the Fleischl-Miescher sodium carbonate is the diluent, in the Hellige-Neoplan decinormal HCl; (3) diluted blood compared with a fixed colour standard, as picrocarmine (Gowers), Haldane's CO method; Sahli's acid haematin and so on.

The authors' investigations were made on normal Indians in Calcutta, normal tea-garden coolies in Assam and on anaemic persons in these localities. A very interesting account is given of the techniques of the methods employed and of the experimental errors which may be very considerable. These details would lose most of their value in attempts to abstract them and the original must be referred to by those interested, that is by nearly every research worker in the tropics. The Tallqvist method used by many, probably because it is the easiest and simplest, had an experimental error as great as 11.8 per cent., the Hellige apparatus \pm 1.4 per cent. or 0.19 gm. Hb. if specially selected tubes were used, otherwise it might be twice as great. They conclude that "provided the colour standard, the tubes and the pipettes of the Hellige haemoglobin apparatus are checked by some absolute method of haemoglobin estimation, it is a method that can be adopted for clinical purposes, or for obtaining scientific data under field conditions."

The authors are carrying out work of inestimable value in presenting this series of investigations, for they are pointing out fallacies in previous standards regarded as normal in blood constituents, clarifying discrepancies between different classes of persons, and if workers in other countries can be stimulated to research on similar lines a series of normals for different races, classes, climates, might be established departures from which might prove of valuable aid in diagnosis and in gauging the results of treatment of disease.

In Part II the authors, in order to determine the normal standards of haematological data for dwellers in a Bengal town, examined samples of blood from doctors, clerks, laboratory assistants and servants, members of the staff of the Calcutta School of Tropical Medicine, 50 in all. They have already shown that the Hb. content of venous blood is distinctly lower than that of capillary blood, and for these investigations extracted blood from a vein. A small drop was taken on a slide for halometric estimation and for differential leucocyte count, while for Hb. determination and for total red and white cell counts the blood was placed into tubes containing powdered potassium oxalate 2 mgm. per cc. blood. For reticulocyte and platelet counts a drop was taken directly from the finger on to a slide prepared with brilliant cresol blue.

The subjects were between 25 and 45 years of age, the majority between 30 and 40 years. The doctors, clerks and laboratory attendants were mostly Bengalis, the servants mostly Ooriyas; all had been living for some time in Calcutta. The clerks gave the highest Hb. figures, the servants the lowest. To test the influence of the food factor the subjects were divided into groups of strict vegetarians, those eating meat occasionally, those having fish daily and meat occasionally, and the regular meat eaters. The numbers in each were small, but among four in Group I the Hb. percentage was 101.7 and in a like number in Group IV it was 114.7; between 16 in I and II together and 27 in III and IV the difference was 6.3 per cent. The authors' findings of 14.7 gm. for men is below SOKHEY's figure of 15.3; this may be accounted for by the fact that venous blood was tested. There is, thus, no evidence for the text-book statement that the Hb. percentage of the blood of Indians is usually lower than that of Europeans. Their eosinophile count of 450 per cmm. or 7 per cent. is above that for normal Europeans.

In Part III similar estimations were carried out to determine normal standards for tea-garden coolies nearly all of whom had lived for 10 years or longer on the garden. The study concerns 41 who must be regarded as "a sample of the clinically-non-anaemic population," not as a sample of the whole coolie population. The Hb. was only about 80 per cent. of that of members of the same race living under town conditions; the reticulocyte and eosinophile counts were markedly higher. It is probable from the latter findings that the coolies examined were not strictly normal and the lower Hb. percentage may be ascribable to some undiscovered pathological process. Six doctors and clerks working in this district were examined and their results closely resembled those of the town-dwellers given above.

H. H. S.

DHAR (Jyoti). Haematological Studies in Indian Women (Part Three). A Preliminary Report on the Determination of the Differential Leucocyte Count in Eighty-Six Normal Bengali Women.—*Calcutta Med. Jl.* 1935. Aug. Vol. 30. No. 2. pp. 65-90. With 2 figs. [42 refs.]

For the purposes of this investigation the author studied 86 young and apparently healthy Bengali women. Sixty-five were students of Ashutosh College, 12 of Bethune College, Calcutta, 5 selected healthy probationer hospital nurses and 4 healthy relatives of in-patients. The leucocyte counts only are dealt with. The following tables compiled from the information given in the paper will save long description.

Cell	Absolute counts per cmm			Relative percentages		
	Min.	Max	Average	Min	Max	Average
Neutrophile ...	1,625	9,994	3,679	46	79	64.8
Lymphocyte...	625	4,050	1,674	17	42	30.2
Large mononuclears	31	300	80	1	6	1.5
Eosinophile ...	31	656	170	1	12	3.2
Basophile ...	31	137	6	1	2	0.1

H. H. S.

POINDEXTER (Hildrus A.). The Differential Blood Picture of a Group of Rural Inhabitants of Alabama.—*Amer. Jl. Med. Sci.* 1935. Sept. Vol. 190. No. 3. pp. 416-423. [27 refs.]

Considerable interest has been aroused of late concerning haematology and standards for different types of persons, notably in India by NAPIER and Das GUPTA (see above p. 75). The present article is a study carried out during a house-to-house investigation of the prevalence of syphilis, a determination of positive reactors to tuberculin, of those with malaria or intestinal parasites among coloured persons in Alabama.

The persons were arranged into five groups: I. Normal, with no indications of disease; II. Those with intestinal parasites, chiefly hookworm or ascaris; III. Those with malaria parasites; IV. Those reacting positively to tuberculin; V. A miscellaneous group giving a history or presenting symptoms of a condition usually associated with eosinophilia—asthma, hay fever, skin lesions, food sensitivity and such like.

In Group I were 401 between 5 and 34 years and 158 between 15 and 30 years. The neutrophiles ranged from 51.0 per cent. in children between 5 and 9 years to 64.0 at age 25-29 years, eosinophiles 12.7 at age 5-9 years, 5.9 at 30-34 years, lymphocytes between 22.8 and 28.3, monocytes 6.0 to 10.3, and basophiles 0 to 1.7 per cent. The percentages differed among those from 15-30 years as compared with figures previously recorded by R. J. NEEDLES from examining 100 nurses. The author's figures were as follows, those of NEEDLES being placed in brackets: neutrophiles 57.3 (70.0), lymphocytes 24.3 (24.6), monocytes 8.3 (3.2), eosinophiles 8.6 (1.7), basophiles 0.7 (0.5).

The Arneeth count also differs; that of the normal negroes was 11.0, 17.6, 18.9, 7.6, 1.9 while among the normal nurses (NEEDLES's figures) it was 8.4, 22.9, 26.7, 8.7, and 3.2 respectively [so stated, but these are clearly not worked out as percentages and the totals differ and are therefore not strictly comparable].

In Group II there were 47 persons; neutrophiles varied between 48.1 and 62.6, eosinophiles between 12.5 and 21.7, monocytes 3.1 and 9.0, other differences were small. In the malaria group of 71 (Group III) neutrophiles varied from 53.9 to 62.1, eosinophiles 4.9 to 6.4, monocytes 6.8 to 10.6. Among 60 in Group IV the only marked variation was in eosinophiles 3.8 to 8.5 per cent. In the last group (Group V) there were 153; little would be gained by giving the limits here because the conditions causing eosinophilia are many and varied and they are not subdivided aetiologically in this article.

In his conclusions the author states that the differential leucocyte picture did "not correlate with that usually recorded in manuals as guides, and averages from more northern climates, and of persons of different occupations. The most consistent differences were a lower neutrophile percentage and a higher eosinophile and monocyte percentage. . . . The average number of granules in the eosinophiles was higher in those with the larger percentage of eosinophiles. The question of whether these differences are racial, meteorologic, occupational, nutritional . . . or a combination of these or other factors, is not answered." [It seems a pity that opportunity was not taken to estimate the haemoglobin of these natives as was done in India.]

H. H. S.

BUCHANAN (George). **Anaemia: Haematological Aspect.**—*South African Med. J.* 1935. Sept. 14. Vol. 9. No. 17. pp. 597-603. [10 refs.]

This paper has much of interest, but what will be of special interest to readers of this *Bulletin* are the introductory paragraphs giving the normal standards of the elements of the blood picture as found in the high veldt, at Johannesburg, 5,750 feet above sea-level. The blood pictures of pernicious anaemia, sprue (one case only), *Diphyllobothrium* anaemia, gastric carcinoma, haemolytic and post-haemorrhagic anaemias have been recorded often and are text-book knowledge and these will not be further spoken of here. The normal standards, however, are of the greatest value for comparison with those recorded in India, by NAPIER and Das GUPTA, DHAR and others, and America by POINDEXTER (see above).

Examination of the blood of 35 healthy adult males, between 20 and 40 years of age, revealed an average erythrocyte count of 6,120,000 per cmm.; of 16 females 5,440,000 per cmm. In only a few healthy

subjects has the author estimated the haemoglobin; he found an average of 15 gm. per 100 cc. [More work is needed here, as in almost every part of the world, before the local standard can be established. This is a study which could be carried out in the many Colonial laboratories with very little difficulty, but one which would be of the greatest value.]

H. H. S.

JETTMAR (H. M.). Küchenschaben als Krankheitsueberträger. [**Cockroaches as Vectors of Disease.**]—*Wien. Klin. Woch.* 1935. Vol. 48. No. 20. pp. 700–704. With 3 figs. [Summarized in *Rev. Applied Entom.* Ser. B. 1935. Sept. Vol. 23. Pt. 9. pp. 212–213.] [Summary appears also in *Bulletin of Hygiene.*]

“Few papers have been published on the part played by cockroaches in disseminating disease. After referring to Toda's investigation on *Blattella (Phyllodromia) germanica*, L., as a possible vector of cholera vibrios, the author records his own observations. In Manchuria and Transbaikalia, *B. germanica* was exceedingly common and overran the bodies of men who had died of plague, feeding on the infected secretions. In experiments, examples of this cockroach lived and reproduced for over a month, during which they were fed exclusively on plague-infected material. Their excreta contained the bacilli in a weakened form, usually incapable of infecting guineapigs by inoculation. After prolonged feeding on infected material, the cockroaches developed in the intestine an active bacteriophage against the bacilli of plague and Asiatic cholera. In view of the occurrence of *B. germanica* and *Blatta (Periplaneta) orientalis*, L., in a hospital, a number of experiments, here described briefly, were made to test the flora of their intestinal contents. It was found that infected cockroaches were able to carry viable, pathogenic streptococci, and that for weeks after the infective feed the excreta contained these organisms in a viable and highly virulent condition. Cockroaches should therefore be kept away from all places where perfect asepsis is necessary. Soiled bandages, etc., should be at once immersed in disinfectant and not stored in pails until burned. As cockroaches are never found in cold storage chambers, bodies and organs can be safely kept there.”

LWOFF (Marguerite). Le pouvoir de synthèse des trypanosomides des culicides. [**The Synthetic Action of Culicine Flagellates.**]—*C. R. Soc. Biol.* 1935. Vol. 119. No. 24. pp. 969–971.

Amongst the flagellates isolated in culture from insects by NOGUCHI and TILDEN (1926) was one form called by them *Leptomonas culicidarum*. It was isolated from both *Anopheles quadrimaculatus* and *Culex pipiens*. The flagellate was subsequently transferred to the genus *Strigomonas* (Lwoff) by THOMSON and ROBERTSON. The author of the present paper now points out that the culicine form has the power of synthesizing protohemine, while the anopheline form has not this power. This property of the culicine form is shared by the plant flagellate *S. oncopelti* and all free-living protozoa so far investigated. It seems to indicate that the culicine flagellate is a more primitive one than the anopheline form.

C. M. Wenyon.

KRISHNAN (K. V.), CHOPRA (R. N.) & MUKHERJEE (S. N.). **Contributions to Protozoal Immunity. Part III. The Role of Electrical Charge in the Phagocytosis of Red Cells.**—*Indian Jl. Med. Res.* 1935. July. Vol. 23. No. 1. pp. 253–262. [11 refs.]

From a study of the migration rate of the red blood corpuscles in an electric field it has been found that in monkey malaria (*P. knowlesi*) the

uninfected cells in general move faster and hence have a greater electric charge than the infected cells, the charge of which, however, decreases with the growth of the parasite. The reticulocytes behave as normal cells some of which, however, in infected blood have an increased density of charge which is due to some undetermined factor. It would seem that in phagocytosis the medium itself plays an important part.

C. M. W.

KOFOID (C. A.), MCNEIL (E.) & BONESTELL (A. E.). **A Comparison of the Distribution of the Intestinal Protozoa of the Norway Rat, Wood Rat, and Guinea Pig with Reference to the Hydrogen Ion Concentrations as determined by the Glass Electrode.**—*Univ. California Public. Zool.* 1935. Vol. 41. No. 1. pp. 1-8.

As the title indicates, the distribution of certain protozoa in the intestine of the animals mentioned was studied, while at the same time the pH of the intestinal contents was taken at different levels so as to throw light on the range of pH tolerated by the protozoa.

C. M. W.

BRUMPT (E.) & LAVIER (G.). Sur une *Nucleophaga* parasite d'*Endolimax nana*. [**Nucleophaga, a Parasite of *Endolimax nana*.**]—*Ann. Parasit. Humaine et Comparée.* 1935. Sept. 1. Vol. 13. No. 5. pp. 439-444. With 1 plate.

Parasites in the cytoplasm of various intestinal protozoa, having the appearance of large cocci within a vacuole, are fairly well known under the name of *Sphaerita*. It is less well known that a similar organism may parasitize the nuclei of intestinal amoebae and give rise to marked hypertrophy of the nucleus which has the appearance of being filled with cocci. The organism, which belongs to the genus *Nucleophaga*, was first seen in *Endolimax nana* and *Iodamoeba bütschlii* in 1921. In the following year EPSTEIN saw it in the nucleus of *E. nana* and named it *Nucleophaga hypertrophica*, while later still BRUG (1926) gave the name *N. intestinalis* to the form seen by him in *I. bütschlii*. In the present paper the author, who has seen the parasite in large numbers in a heavy infection of *E. nana*, redescribes and figures it. He comes to the conclusion that in the parasitic amoebae one species alone occurs which should bear the name *Nucleophaga hypertrophica* Epstein, 1922. The same individual harboured also *Entamoeba dispar* (*E. histolytica*) which was parasitized by *Sphaerita* but not by *Nucleophaga*.

C. M. W.

GIEMSA (G.). Die Romanowsky-Färbung protozoischer Blutparasiten in alten Trockenausstrichen. [**Staining of Parasites in Dry Blood Films.**]—*Zent. f. Bakt.* I. Abt. Orig. 1935. Sept. 5. Vol. 134. No. 7/8. pp. 483-486.

The author discusses the possibility of obtaining a satisfactory method of staining old blood films with Giemsa stain. He concludes that this can only be done if the films without fixation have been stored in a perfectly dry atmosphere over calcium chloride. Films so stored have been stained well after 28 years, by using the customary solution, viz., 10 drops of stain to 10 cc. of water (buffered and at a pH of 7.2 to 7.5 according to the age of the film).

C. M. W.

MENON (T. Bhaskara) & KRISHNASWAMI (T. K.). **The Nature of the Donovan Body of *Granuloma inguinale*.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. June 29. Vol. 29. No. 1. pp. 65–72. With 1 plate. [14 refs.]

The Donovan bodies met with in granuloma inguinale appear to be small intracellular Gram-negative bacilli which during division give the appearance of bipolar staining and diplococci. C. M. W.

MALAMOS (B.). Grahamellen beim Affen. [**Grahamella in the Monkey.**]—*Zent. f. Bakt.* I. Abt. Orig. 1935. June 14. Vol. 134. No. 3/4. pp. 152–153. With 1 fig.

In the blood of a West African monkey, *Cercopithecus mona*, which had been experimentally infected with *Plasmodium knowlesi*, rendered immune to this infection and subjected to splenectomy, a scanty infection of the red blood corpuscles with a *Grahamella* was discovered. Whether this represents a new species (*G. cercopitheci* n. sp., as distinct from *G. rhesi* described by A. Léger in 1922) future work alone will show. It seems possible that in this case the monkey contracted an accidental infection from one of the smaller rodents. C. M. W.

SAMUEL (J.). **Rengas Poisoning.**—*Malayan Med. Jl.* 1935. Mar. Vol. 10. No. 1. pp. 14–15. With 4 figs.

Rengas poisoning is due to the sap of *Gluta rhengas* L. (N.O. Anacardiaceae) or an allied tree, is found among estate labourers, gardeners and woodcutters in Malaya and is attended by acute dermatitis and constitutional symptoms. A case is described and figured.

A. G. B.

RAYMOND (W. D.). **A Note on Cases of Poisoning by *Jatropha multifida*, L.**—*East African Med. Jl.* 1935. May. Vol. 12. No. 2. pp. 57–58.

The author remarks that at least three cases of poisoning by the coral plant, *Jatropha multifida*, have been reported in Tanganyika, the symptoms being colic, cramps, thirst and a subnormal temperature; in one, a fatal case, vomiting of a black colour occurred. The author mentions two other species, *J. curcas* and *J. glandulifera*. [*J. curcas* is common in the West Indies and is known as Physic nut, *J. multifida* as French physic nut. The former grows rapidly and is used by the natives in Jamaica (and perhaps elsewhere) for fencing small compounds. The nuts are palatable and taste like sweet almond. It is a handsome plant; a good coloured illustration of *J. multifida* is given in BYAM and ARCHIBALD's Practice of Medicine in the Tropics, Vol. I. Another species, *J. gossypifolia*, is known locally in the West Indies as Wild Cassava or Belly-ache bush. The seeds when eaten act as a gastro-intestinal irritant, something like croton. A fifth species *J. urens* also occurs in the West Indies; its leaves have stinging hairs which cause smarting, itching and general symptoms of flushing of the face, swelling of the lips, faintness; recovery is usually fairly rapid after ejection of the poison by vomiting.] H. H. S.

REVIEWS AND NOTICES.

SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH. Annual Report for the Year ended 31st December, 1934 [LISTER (Spencer), Director].—92 pp. With 2 plates. Johannesburg: P.O. Box 1038.

There is little to say concerning the routine work of the Institute except that an enormous amount of very necessary investigation is done and at the Port Elizabeth Branch laboratory a large increase in the number of specimens was dealt with, 27 per cent. more than in the preceding year. These were all of a routine character, 95 per cent. bacteriological and pathological, 3 per cent. biochemical and 2 per cent. parasitological. Of these there is no need to speak in detail.

In the domain of Research each Department has contributed its quota. In that of Bacteriology mention may be made of pneumonia and the periodic adjustments which are necessary in the constitution of the prophylactic vaccine, and of the enquiry into the virulence of strains of *P. pestis*. Much work was done in the usual summer outbreak of plague. The Department of Industrial Hygiene carried out investigations on Silicosis and this was aided by the Pathological Department's research on the extraction of mineral residues from normal and from silicotic lungs and an experimental silicosis by intravenous inoculation of rabbits with suspensions of the mineral residues extracted from the lung of a patient with rapidly developed gross silicosis. In the Biochemical Department vitamin research was carried out, a study of the present diets in the mines, analyses of food-stuffs, consideration of alternative rations, study of nutritional deficiencies and so on. The Pathological Department, in addition to the work referred to above, carried out research on cancer and, in conjunction with the serum department under Dr. E. GRASSET, on the influence of snake venoms and anavenoms on animal tumours. The Malaria Research Station was moved from the Northern Transvaal to Natal and ultimately was established at Eshowe, Zululand.

Twenty-three papers, relating to the work done, have been published during the year by members of the staff. H. H. S.

DE RIVAS (Dámaso) [B.Sc.Biol., M.S., M.D., Ph.D.] in collaboration with Carlos T. **DE RIVAS**, B.A., M.D. **Clinical Parasitology and Tropical Medicine**.—367 pp. With 144 figs. & 1 coloured plate. 1935. London: Henry Kimpton, 263 High Holborn, W.C. [22s. 6d.]

In this book of 350 pages, an account is given of most of the animal parasites of man and of the more important tropical diseases. The type is large, the space is limited, and much of it is occupied by illustrations, with the unavoidable result that many subjects have had to be dealt with in a very summary manner. The morbid conditions caused by animal parasites, and the parasites themselves, are adequately described; but bacterial diseases, and those of uncertain causation, are rather crowded out. The authors evidently write from a large and practical experience; medical men who already have some knowledge of tropical medicine will find the book interesting and stimulating; but beginners will not find it very easy reading.

The early chapters give a general account of the nature of parasitism, the relations of parasites to their host, the metabolic disturbances

caused to the latter, and the effects of secondary bacterial infections ; some space, too, is given to the mental disorders caused by the presence of parasites in the body.

From their own experiments the authors have found that parasites, both Protozoa and Metazoa, are extremely susceptible to relatively small variations of temperature. *Entamoeba histolytica* is killed in 5–10 minutes by exposure to the temperature of 45°C. When kept in sealed capillary tubes at 5°–10°C., the amoebae remained alive for over 48 hours ; it appears therefore that, if material suspected to contain *Entamoeba* cannot be examined immediately, it is better to keep it on ice than at body temperature. Round worms and tapeworms of man and the dog were also killed in 5–10 minutes by exposure to 45°C. These facts suggested a method for the expulsion of parasites inhabiting the intestine. In dogs the application of heat (45°–47°C), for 10–15 minutes, by lavage with physiological salt solution, of the colon through a rectal tube, and of the upper intestine by means of a duodenal tube introduced through the mouth, caused no appreciable symptoms or pathological changes in the intestinal mucosa or other tissues of the animals. The authors consider that the anthelmintics in common use effect the expulsion of parasites chiefly through a toxic reaction on the part of the host, and by variations in the host's temperature. As is well known, it is a common occurrence for parasites to be passed during the course of acute infections, especially when accompanied by high fever. Experiments were made with many reputed anthelmintics, by direct exposure of the worms to solutions of the drugs ; the results were unsatisfactory, as no specific action on the parasites could be observed. The most effective direct parasiticide was found to be a hot mixture of equal parts by volume of a 30 per cent. solution of magnesium sulphate and glycerine. With this mixture, *Amoeba*, *Paramaecium* and *Giardia* were killed in half to two minutes ; *Ancylostoma*, *Oxyurus* and *Trichinella* in 5–10 minutes, and *Dipylidium* in 3–5 minutes. The authors consider that the "intra-intestinal thermal method," which they use for the treatment of infection with intestinal parasites, is so superior to other forms of treatment that they have completely abandoned the use of ordinary anthelmintics. In over 1,000 cases, treated by this method, no serious complications have occurred, other than perspiration, nausea, colic, and, at times general weakness and headache, all of which conditions have yielded to simple treatment. In the case of tapeworms, the whole worm with the scolex intact is discharged. The technique of lavage through duodenal or rectal tubes is described at length ; it may have to be repeated several, even many, times ; thus, in a case of *Trichomonas* infection in an adult, 42 lavages were required for the complete eradication of the parasite.

The chapter on malaria gives a good account of the disease, but it is not long enough to deal sufficiently with some aspects of it. Emphasis is laid on the need for caution in the treatment of paresis by malarial infection, for which the authors consider that only a very limited number of paretics would be suitable ; they think that "such therapeutic measures remain in the domain of theoretical speculation, the final result of which awaits further confirmation."

There are a good many misprints in this book, and some instances of the incorrect use of zoological terms. Many of the illustrations are good, but most of those representing sections of diseased organs are not well reproduced. The book can be recommended as an instructive work by writers who think for themselves, and who have brought acute

and original minds to the subjects they discuss. They are no blind followers of authority, and very rightly prefer to base their opinions on their own experience and observation. They criticize frankly many of the commonly held optimistic views of the ease and success of the usual methods of treatment ; and they show that, although much has already been accomplished, there still remains much to be done for the elucidation of the aetiology and modes of transmission of parasitic and other tropical diseases.

H. J. Walton.

FRÓES (Heitor P.). *Lições de clinica tropical. Vol. II. Livro II (3a Serie). Doenças ou afecções causadas por animais não parasitas prejudiciais ao homem.* [Lectures in Tropical Medicine.]--pp. xi+238. With 83 figs. 1935. Bahia.

The first part of Vol. II of the system was reviewed a few months ago (see this *Bulletin*, Vol. 32, p. 603) and mention was then made of the fact that two years had elapsed since the first volume had appeared and a hope expressed that there might be a speeding up with future volumes. This is being done and the present volume follows the last at an interval of 3 months only. It covers a wide field and contains 10 lectures, most of which would probably have to be subdivided for class purposes. It deals generally with "diseases or affections caused by non-parasitic animals harmful to men." The first two chapters are concerned with arthropods ; one with diptera, phlebotomus, simulium, bees, wasps ; Coleoptera and vesiculating species of *Paederus*, with caterpillars (*largarta de fogo*) and certain grasshoppers and crickets (as *Jaquirinabóia*). The second chapter treats of spiders, scorpions, centipedes, mites and ticks, and the third gives a short account of coelenterates, echinoderms, mollusca and crustacea. Next come 4 chapters on fish, including those inflicting direct injury, from diodon to sharks, those with poisonous spines, those poisonous as food, and harmful ones such as the electric eel. Two chapters are given up to description of poisonous snakes, the symptoms they produce and the treatment of snake bite, and a terminal chapter deals with "other non-parasitic animals injurious to man" and includes poisonous lizards, eagles, condors, saurians, tigers, a heterogeneous group. Since all this is comprised within 240 pages and there are 83 illustrations, several of them full-page, the information imparted is not detailed, but doubtless in practice the delivery of the lectures is supplemented. The work is well documented.

H. H. S.

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN.

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HELMINTHIASIS.

McCoy (O. R.). *The Physiology of the Helminth Parasites.*—*Physiol. Rev.* 1935. Apr. Vol. 15. No. 2. pp. 221-240. [70 refs.]

A very valuable summary of work and opinion on this subject. It is probable that no abstract could deal properly with it. This does not.

Respiration and metabolism.—Taking samples of the 3 main groups of parasitic helminths, *Fasciola hepatica* for Trematoda, *Moniezia expansa* for Cestoda and "*Ascaris suum*" for Nematoda, the general facts are the same. In anaerobic conditions glycogen becomes less in the worm, and carbon dioxide and fatty acids become present in the outside medium. In aerobic conditions the absorption of oxygen is in direct proportion to the oxygen tension of the medium and the amount of carbon dioxide given off is not in proportion to this absorption. The conclusion is that the metabolism is non-aerobic and consists of fermentation of glycogen into carbon dioxide and fatty acids. The objection that this change is really due to bacteria is answered by the fact that succinic acid is present equally round *Moniezia* and in hydatid fluid, and that while the acids present round the same parasite are always the same, those present round different parasites are different.

Nutrition.—The food in general is of easily absorbed substances in the intestine or tissues of the host. Some worms seem to produce outside themselves digestion of the host's tissues which they then take into themselves.

Growth.—This is dependent on factors in the host of which there is little knowledge, except that there is variation within the species and in addition within the individual. Its amount is reasonably well marked out by a logistic curve which is the same for different stages of the same worm when the conditions are normal for that stage—for example for the larval stage of the dog hookworm outside the body at 24.5°C. and for the parasitic stage at 37.5°C.

Reproduction.—The great capacity for this is a measure of the great risks which overtake an individual in its passage from egg to worm. It is greatest in those hosts which are not "immune" but there is no knowledge of the method of working of this mechanism.

Secretions.—Anti-enzymes are present and seem to have an important part in keeping worms from being digested, so long as they are living. Anticoagulins are a property chiefly of bloodsuckers, haemolysins of

the tissues of parasites and not of secretions, histiolysins of extra-parasitic digestion or of stages which are in fact those in which entry is gained into a host. Of exotoxins there is no evidence, of endotoxins some in infection with *W. bancrofti*.

Tropism.—McCoy quotes LANE's belief [this *Bulletin*, Vol. 28, p. 228] that thigmotaxis is the only tropism of hookworm larvae [but in justice to the memory of Professor FÜLLEBORN the reviewer has to point out his own later decision that they have a thermotaxis (this *Bulletin*, 1933, Vol. 30, p. 687)]. Clayton Lane.

JOYEUX (C.) & MER (J. G.). Les hôtes d'attente dans le cycle évolutif des helminthes. [**"Waiting Hosts" in the Developmental Cycle of Helminths.**]—*Biol. Méd.* 1934. Vol. 24. No. 9. pp. 1-25. With 6 figs. [28 refs.] [Summarized in *Vet. Bull.* 1935. Sept. Vol. 5. No. 9. p. 563.]

"The authors here bring together an interesting collection of facts concerning the life-histories of nematodes, cestodes, trematodes and acanthocephalids, exemplifying the use which these parasites often make of a third host occurring between the intermediate host and the definitive host; to this third host the authors give the name "waiting host." The waiting host often serves only to collect larvae which are already sufficiently mature to take up their existence in the definitive host, but in other instances the larva which is not yet sufficiently mature passes through a slight change, which renders it infective for the final host. The waiting host usually plays an important part in collecting larvae to ensure the continuation of the species by bringing about a reasonably heavy infection of the final host, but many of them re-encapsulate in creatures which are not eaten by the definitive host and so never attain maturity. In studying the life-history of parasitic worms, and encountering accidental larval forms in hosts which would not acquire them in the normal course of events, it is unsafe to assume that the intermediate host has been found."

SCHWENCK (J.). Tropismos e tactismos. [**Tropisms including Thigmotropism.**]—*Ann. Paulist. Med. e Cirurg.* 1935. Sept. Vol. 30. No. 3. pp. 213-227.

A disquisition on tropisms in general but treating mainly of thigmotropisms and taking into account not only helminths but also insects. No original experimental work is recorded. H. H. S.

TAYLOR (E. L.). **Some Fallacies in the Diagnosis of Helminthic Disease.**—*Proc. Roy. Soc. Med.* 1935. June. Vol. 28. No. 8. pp. 1002-1004 (Sect. Comparative Med., pp. 44-46).

The author's last paragraph is in these words:—

"The problem before the medical or veterinary diagnostician is to determine the presence of disease—not merely the presence of parasitism. In many instances the determination of the nature of a disease caused by parasitic worms and how it may be diagnosed (the number of worms required to cause it) is still a research problem, but adherence to the medical or veterinary approach to the subject rather than to the more specifically biological one—i.e. from the angle of disease rather than from the angle of the parasite—should help to avoid such fallacies as these."

C. L.

ESPRÉ (A.). Parasitisme intestinal infantile en Tunisie. 5e région. [Intestinal Parasites in Children in Tunis.]—*Arch. Inst. Pasteur de Tunis*. 1935. Apr. Vol. 24. No. 2. pp. 368-370.

The first systematic study, it is claimed, of intestinal parasitism in Tunis.

The place is Ben Gardane, 100 school children had a faecal examination. Apart from *E. coli* 50 were infected, namely with ascaris 35, with trichuris 17, with *H. nana* 8, with hookworms 4. If *E. coli* is included 69 were infected. Tables give the numbers who have infection with 1, 2 and 3 kinds of parasite, with and without cysts. C. L.

TAO (C. S.), YU (T. H.), CHU (P. J.) & WANG (C.). Study on the Prevalence of Intestinal Parasitic Infection among School Pupils in Shanghai.—*Chinese Med. Jl.* 1935. June. Vol. 49. No. 6. pp. 570-576. With 1 chart. [13 refs.]

An investigation, of the faeces of 1,412 children in the Wanchu primary school, Westgate, in the City of Shanghai.

Faeces, 1 gm., was thoroughly stirred with 25 per cent. antiformin solution, put through a filter of thin gauze, centrifuged, fluid decanted, sediment stirred with hydrochloric acid and ether, again centrifuged and decanted, one drop of the precipitate put on a slide when the writer "counted and recorded the number of eggs." The number of eggs is however not mentioned; the percentage of infections are these: all infections 48.4, ascaris 35.9, trichuris 22.8, fasciolopsis 1.6, hookworm 0.6, clonorchis 0.3. The children appear to have been of the middle class. C. L.

OHASHI (Kenji). The Results obtained in Hyogo Prefecture by the Use of Improved Privies of the Home Office Design on the Prevention of Parasite Diseases.—*Jl. Public Health Assoc. Japan*. 1935. June. Vol. 11. No. 6. pp. 1-4.

Judging by drawings in the Japanese text the privy was that described by TAKANO [this *Bulletin*, 1928, Vol. 25, p. 938] with 2 upright and 2 hanging baffles. The results of examinations of privies and persons using them in 2 villages, where they seem to have been put up in all the houses, are given.

Treatments were given during the period of observation at least in Yoshiiri village. In it the percentages of infected persons in 1929 and 1934 were: for ascaris 27.2 and 20.5, for hookworms 23.3 and 1.7, for trichostrongylus 7.3 and 0, for metagonimus 1.5 and 0, for trichuris 68.4 and 35.7. In Yamada village the figures were: for ascaris 63.4 and 52.6, for hookworms 6.6 and 0, for trichuris 63 and 50.8. As to the privies in Yamada those containing live eggs were 17.4 per cent. in 1930 and 9.1 in 1924 [? 1934]; the figures for Yoshiiri are not understandable. C. L.

KOURI (Pedro) & DEL FRADE (Alejandro). La clonorchiasis en la ciudad de la Habana. [Clonorchiasis in Havana.]—*Rev. Parasit., Clin. y Lab. Habana*. 1935. Sept.-Oct. Vol. 1. No. 1. pp. 37-52. With 4 figs. English summary.

There is at present no danger of the spread of clonorchiasis in Cuba because the intermediate host is absent. The authors examined

100 Chinese, all immigrants from Canton, who complained of vague hepatic and intestinal symptoms, and found 49 of them to be passing ova of *Clonorchis sinensis*. This number was found positive by direct examination of the faeces; the actual number was probably greater. In 3 out of 6 autopsies the worm was seen in the bile ducts.

H. H. S.

UYENO (Hiroshi). Ueber den Zucker-, Fettstoffwechsel und die passive Anaphylaxie bei experimenteller Kaninchenclonorchiasis sinensis. (3. Mitteilung.) Der Anaphylaxieversuch bei Kaninchenclonorchiasis.—*Okayama-Igakkai-Zasshi* (Mitt. d. Med. Gesellsch. z. Okayama). 1935. May. Vol. 47, No. 5. [In Japanese pp. 1161–1172. With 3 charts. [34 refs.] German summary pp. 1160–1161.]

KOURI (Pedro), BASNUEVO (Jose G.), ALVARE (Leopoldo) & LESCANO (O.). Técnica para el estudio de la anatomía de la *Fasciola hepática*. [Technique for Study of the Anatomy of *F. hepatica*.]—*Rev. Parasit., Clin. y Lab.* Habana. 1935. Nov.–Dec. Vol. 1. No. 2. pp. 191–195. With 3 figs.

The anatomical structure of *F. hepatica* is easily made out with a lens or even with the unaided eye when the worm is freshly removed from the liver, but preservation usually soon obscures the details. The authors have found the following procedure successful:—

The worm is placed between two glass slides and gently compressed by tying the slides together with cotton; it is left for 12 hours in "10 per cent. formol." At the end of that time one slide is carefully raised (keeping it under water) and then the preparation is allowed to stay for another 12 hours, after which it is washed for several minutes in running water.

For staining Mayer's acid haemalum or Hansen's haematoxylin is recommended. The fluke is placed in a vessel containing the stain, and, after 3–5 minutes, is washed in running water or water made faintly alkaline with potash alum, or sodium or lithium carbonate. The haematoxylin stains more rapidly and if too deeply differentiation with 1 per cent. acid alcohol (HCl) should be carried out. Dehydration by graded alcohols and clearing by xylol or carbol-xylol and mounting in balsam follow in the usual way. The superposition of a 20 gm. weight on the glass for several days to keep the preparation flat is recommended, care being taken not to tilt the specimen whereby the canada balsam might run out and the specimen become dry.

H. H. S.

KOURI (Pedro). Técnica para el examen de la bilis, obtenida por intubación duodenal, en el diagnóstico de certeza y en el control terapéutico de la fasciolosis hepática. [Examination for *Fasciola hepatica* by Duodenal Sound.]—*Rev. Parasit., Clin. y Lab.* Habana. 1935. Sept.–Oct. Vol. 1. No. 1. pp. 53–67. With 9 figs.

In this article Professor Kouri describes in detail his technique for examining specimens of bile obtained by means of the duodenal sound to confirm a diagnosis of infestation by *Fasciola hepatica*. It is abundantly illustrated, even to the extent of depicting a microscope

and an observer searching for ova and an indication that the coarse adjustment is even better than the fine for this purpose. For actual details of the technique the original must be consulted. H. H. S.

KOURI (Pedro) & VALVERDE (Armando). Nuevo caso cubano de Fasciolosis hepática humana. Curación por la emetina. Estado actual de la emetinoterapia en esta parasitosis. [*Fasciola hepatica* Infestation in Man cured by Emetine.]-*Rev. Parasit., Clin. y Lab.* Habana. 1935. Sept.-Oct. Vol. 1. No. 1. pp. 1-15. [19 refs.]

A Cuban, 30 years of age, had a series of epileptiform attacks in the early morning. Examination of stools revealed ova of *F. hepatica* and confirmation was obtained by duodenal sound. He was treated by emetine hydrochloride intramuscularly and recovered: i.e., during two months observation and examination of faeces after cessation of treatment no ova were discovered. Altogether he was given 46 cgm. of the drug. The plan of treatment was 2 cgm. on alternate days for three doses; then an interval of a month. Ova were fewer and degenerated for a time but then reappeared and four doses each of 4 cgm. were given on alternate days. Nine days after the last of these, three more doses were given, each of 4 cgm. A fourth series of 3 doses of 4 cgm. on three consecutive days was given 6 days after the termination of the third series; this was given "owing to the impatience of the patient," the author did not think it was needed.

The method recommended by the author is to give altogether 3 mgm. of the emetine per kilo body weight, i.e. 210 mgm. for a man of 70 kilos, in doses of 6, 5, 5, 5 cgm. on successive days, with daily examination of faeces and intubation (duodenal sound) once or twice. If ova continue to be present in faeces or bile after an interval of some days 4 cgm. more should be injected and further examinations made for ova. Patients have been followed up for as long as four years and have remained cured. H. H. S.

KOURI (Pedro) & VALVERDE (Armando). Nuevo caso cubano de fasciolosis hepática humana. Curación por la emetina.—Estado actual de la emetinoterapia en esta parasitosis. [*Fasciola hepatica* in Man. Treatment by Emetine.]-*Medicina Países Cálidos*. Madrid. 1935. Oct. Vol. 8. No. 10. pp. 457-468. [19 refs.] French summary (4 lines).

The authors describe another case of infestation by *F. hepatica* in Cuba.

A man of 30 years suffered from a fit of an epileptiform character. No reason was discovered for this, but faecal examination revealed ova of *Trichuris*. Three years later he had a similar attack and these ova were again found. Six months later, after a third fit, ova of *F. hepatica* were seen in the faeces and a duodenal sound was passed and in the bile they were present in large numbers. Treatment with emetine was continued at intervals over a period of 2 months. The ova gradually disappeared, first from the stools and later from the bile, the patient gained weight, and regained energy and there has been so far [barely 3 months] no return of the fits nor of the dyspeptic symptoms of which he formerly complained. The total amount of emetine hydrochloride injected was 46 cgm. which was 6.4 mgm. per kilo body weight. H. H. S.

GABRIELJAN (M. J.). *Komplikationen bei der Emetintherapie von seiten des Nervensystems. [Nervous Complications in Treatment by Emetine.]—Arch. f. Schiffs- u. Trop.-Hyg.* 1935. July. Vol. 39. No. 7. pp. 287-291.

Eight cases were given emetine injections up to 60 in number with appearance of nervous symptoms, 5 of them had infection with *Fasciola hepatica*. The author seems to have little interest in its effect on the worms. C. L.

JEREMY (R.) & JONES (E. B.). *Report of a Patient with Hepatic Distomiasis.—Med. Jl. Australia.* 1935. Sept. 14. 22nd Year. Vol. 2. No. 11. pp. 351-352. With 1 fig.

After two laparotomies for enlarged liver, the eggs of *Fasciola hepatica* were found in the faeces having been looked for when there had been seen in the liver rounded areas with contents having the appearance of iodoform crystals.

Carbon tetrachloride was then given in dosage of 2.4 cc. three times with 14 days between doses, the liver became normal in size and ova were no longer seen in the faeces. C. L.

AFRICA (Candido M.), GARCIA (Eusebio Y.) & DE LEON (Walfrido). *Intestinal Heterophyidiasis with Cardiac Involvement: a Contribution to the Etiology of Heart Failures.*—Reprinted from *Philippine Jl. Public Health.* 1935. Mar.-June. Vol. 2. Nos. 1-2. 22 pp. With 23 figs. on 6 plates & 1 chart. [10 refs.] Abridged version in *Jl. Philippine Islands Med. Assoc.* 1935. July. Vol. 15. No. 7. pp. 358-361. With 4 figs. on 1 plate.

Heterophyids have been found in 9 of 108 autopsies at Manila in the wall of the intestine and their eggs in the heart in those cases in which there was examination of this organ. Six of the 9 cases justified a certificate (from anatomical findings) of death from cardiac beriberi or acute cardiac dilatation. Most of them came from provinces where raw fish and "bagong" are articles of food. There is comparison of these findings with others from dogs.

In man the worms have been identified as *Monorchotrema taichi*, *M. taihokui*, *Diorchitrema pseudocirrata* (already seen in dogs); *Heterophyes breviaeca* (Africa and Garcia, 1935); and a *Plagiorchis* species apparently new. In the dog there have also been seen *Heterophyes expectans*, *Stictodora manilensis*, *Apophallus eccentricus*, and *Monorchotrema calderoni*.

In no dog or man have the eggs been seen in the faeces, although in dog a teaspoonful of these almost microscopic flukes has been taken from the intestine as compared with a few examples only in man. But because in man so many of these infections had had heart symptoms, the hearts of 5 of the 9 (all that could then be got) were put under microscopic examination and trematode eggs brought to view in them. So that the opinion of the authors is that, since eggs were not getting out of the hosts, man and dog are equally unnatural hosts; for which reason it has been judged wise to give above the list of those worms which have so far been seen in dog but not in man. But in dog and man the worms are present not only in the lumen of the bowel but in its wall, as is seen when this is scraped or sectioned; and the eggs

are very small 16 by 10 μ to 33 by 25 μ and capable of carriage by blood or lymph. In no case did the naked eye appearance of the intestine suggest that it had worms within it and in dogs the reactions to their presence were small, only a little congestion with petechial submucous haemorrhages, which are specially common with sudden death and in beriberi. In the heart subepicardial haemorrhages of different sizes were readily seen, most commonly on the right side. The organ was somewhat dilated with walls thicker than normal, this being caused by oedema, with which fluid all spaces between muscle fibres were overfull; the blood vessels were engorged and being, by reason of the oedema, without proper support there was often a burst with haemorrhage, and eggs visible among the red cells. The suggestion is that there is embolism of capillaries by eggs, muscular spasm from local bloodlessness, and rupture of muscle and capillaries. Many eggs may be got by squeezing a cut surface of the heart. The question comes up: Is this embolism limited to the heart? The condition of other organs has not yet been looked into, but this limiting is hardly likely. At least in "wet beriberi" there should be thought of Heterophyids as its cause. C. L.

AFRICA (Candido M.) & GARCIA (Eusebio Y.). **Heterophyid Trematodes of Man and Dog in the Philippines with Descriptions of Three New Species.**—*Philippine Jl. Sci.* 1935. June. Vol. 57. No. 2. pp. 253-267. With 4 plates.

The worms described and figured are: *Heterophyes expectans* n. sp. in dog, *Heterophyes brevicæca* n. sp. in man (see p. 90). *Stictodora manilensis* n. sp. in dog, *Monorchotrema* spp. from dog and man probably *M. taihokui* Nishigori, 1924 and *M. taichui* Nishigori, 1924, and *Diorchitrema* sp., probably *D. pseudocirrata* (Witenberg, 1929).

C. L.

WATANABE (Masumi). Ueber den Körperbau des Miracidiums von *Paragonimus westermanii*. [The Structure of the Miracidium of *Paragonimus westermanii*.]—*Okayama-Igakkai-Zasshi (Mitt. d. Med. Gesellsch. z. Okayama)*. 1935. June. Vol. 47. No. 6. [In Japanese pp. 1474-1479. With 6 figs. on 1 plate. German summary p. 1473.]

The miracidium of *P. westermanii* has these distinctive characters.

The ciliated covering is made up of 17 cells in 4 rows, the numbers in each row being 6, 7, 3 and 1. There is an anterior cone, no eye spots, a pair of sense organs, a pair of terminal cells, the excretory canal forming a rosette; the presence of unicellular glands and lenticular bodies is doubtful. [The fine drawings have pointers with roman letters, but they are explained by Japanese words only and so lose most of their value for those of other nations.] C. L.

WU (Kuang). **Notes on Certain Larval Stages of the Lungfluke, *Paragonimus* in China.**—*Chinese Med. Jl.* 1935. Aug. Vol. 49. No. 8. pp. 741-746. With 4 figs. on 2 plates.

A description of the second generation redia and the cercaria of the *Paragonimus westermanii*.

The rightness of identification is evidenced by the fact that the cercaria from *Melania libertina* has penetrated the leg-joints of *Potamon* crabs, with metacercariae 23 days later encysted in the leg muscles, these having the structure of those of *Paragonimus*. The cercaria is microcercous, unable to swim, but "moves like a measuring worm." An anterior spine lies on the antero-dorsal aspect of the oral sucker, there is a slender prepharynx, pharynx 0.015×0.012 mm. about midway between the two suckers, 7 penetration glands a side, 4 of them large and lateral and 3 small and medium, a tubular excretory system. Wu holds with AMEEL (*Amer. Jl. Hyg.*, 1934, Vol. 19, p. 296) that the cercaria described by FAUST (*Parasitology*, 1922, Vol. 14, p. 264) is not that of *Paragonimus*. C. L.

LEO (T. L.). **A Case of Paragonimiasis.**—*Chinese Med. Jl.* 1935. Aug. Vol. 49. No. 8. pp. 784-788. With 1 fig.

This is believed to be the first case of paragonimiasis from Mukden and indeed from Manchuria. A microphotograph shows the ova. It was cured by 37 grains of emetine, apparently in 3 courses.

C. L.

CHEN (H. T.). **Notes on Paragonimus in Rats.**—Reprinted from *Lingnan Sci. Jl.* Canton. 1934. Apr. Vol. 13. No. 2. pp. 329-330.

The rat is a host of *Paragonimus*, presumably near Canton. Three of about 6 rats had 1 to 3 mature specimens of *Paragonimus* in their lungs, a dog had one. Local examinations of crustaceans have so far all been negative.

C. L.

WATANABE (Masumi). Ueber die Embryonalentwicklung von *Paragonimus westermanni*.—*Okayama-Igakka-Zasshi (Mitt. d. Med. Gesellsch. z. Okayama)*. 1935. May. Vol. 47. No. 5. [In Japanese pp. 1173-1190. With 18 figs. on 3 plates. [11 refs.] German summary p. 1173.]

KHALIL Bey (M.) & AZIM (M. Abdel). **The Introduction of Schistosoma Infection through Irrigation Schemes in the Asswan Area, Egypt.**—*Jl. Egyptian Med. Assoc.* 1935. June. Vol. 18. No. 6. pp. 371-377. With 1 map & 2 figs.

A first step in an investigation of the effects, in a special area, of using perennial in place of basin irrigation in Egypt.

In the stretch of Nile from Assuan to Esna there have been set up 12 electric pumps to fill the irrigation waterways at all times of the year. A pump is usually at work for 3 or 4 days every 2 weeks, it sends the water into a discharge basin and from this into the main canal of the district, and a strong valve puts a stop to passage of water back into the river when the pump is no longer at work. The suggestion now is that these valves should be out of action when the pump is not in use, so that the water in the canal will make its way back into the river and the whole bed become free of water, since any hollows in it will become dry quickly in the general conditions. A survey has been made of the different helminths present in the population so that comparison may be made in the future. C. L.

BARLOW (Claude H.). **Further Studies of the Revival, after Drying, of the Snail Hosts of the Human Schistosomes of Egypt.**—*Amer. Jl. Hyg.* 1935. Sept. Vol. 22. No. 2. pp. 376-391. With 2 figs.

The winter closure of irrigation waterways in Egypt has a great effect on health by causing the death of many larval hosts of schistosomes and of the schistosome larvae in such molluscs as are still living after it.

The work is an addition to that already noted in this *Bulletin* (1933, Vol. 30, p. 674). After about 40 days of the slow drying which takes place in the irrigation waterways during winter, 91 per cent. of 562 *Planorbis boissyi* and 90 per cent. of 199 *Bulinus contortus* were still living. When after such drying snails were put aside in the laboratory they were found living up to as much as 180 days of drying, and the belief is that, on account of the small numbers which by that time were still there to be used for testing, the time limit is probably longer. The marked effect of drying on the percentage of infected snails is seen in the table.

Comparison of infection percentages in snails revived after desiccation and those living in water.

(Canal V.)

Date of collection	Species	Total collected	Number examined	Per cent. infected
Sept., 1934 ...	<i>P. boissyi</i>	69 (from water)	69 (undried)	69.5
Sept., 1934 ...	<i>B. contortus</i>	126 (from water)	126 (undried)	22.2
Jan. 15, 1935...	<i>P. boissyi</i>	27 (dry)	27 (revived)	29.6
Jan. 15, 1935...	<i>B. contortus</i>	61 (dry)	61 (revived)	4.9
Jan. 27, 1935	<i>P. boissyi</i>	210 (dry)	172	5.8
Jan. 27, 1935	<i>B. contortus</i>	537 (dry)	161	0.0

Then, too, it is clear that this disappearance of infection is in part caused by death of the larval schistosomes in the mollusc. "There are thousands of miles of canals which are the ideal habitat of both species of significant snails, which show no infection at all at the end of the winter closure, and this has a tremendous bearing on the control problem." Again, when put in water after drying the molluscs lay many more eggs in the same time than do those which have not been dried.

C. L.

SCARTOZZI (Cesare) & **PARVIS** (Flavio). Contributo allo studio della formula leucocitaria nella bilharziosi vescicale egiziana. [**The Differential Leucocyte Count in Bilharziasis in Egypt.**]—*Giorn. di Batteriol. e Immunol.* 1935. Oct. Vol. 15. No. 4. pp. 571-582. [12 refs.] English summary (5 lines).

"The author studying from the haematological standpoint 67 cases of 'Egyptian bladder bilharzia,' found a general average of 13.7 per cent. eosinophile (maximum 42 per cent.), and of 10 per cent. monocyte (maximum 26 per cent.).

"In some cases moreover they remark that there is a sort of antagonism between eosinophilia and monocytosis."

C. L.

See also p. 148, **SALAH**, **Helminthic Anaemias in Egypt.**

GIORDANO (Mario). Lo stato attuale della schistosomiasi in Libia, con speciale riguardo alla schistosomiasi vescicale nel Fezzan.—*Arch. Ital. Sci. Med. Colon.* 1935. July 1. Vol. 16. No. 7. pp. 510-515. English summary (3 lines).

ADAMS (A. R. D.). Studies on Bilharzia in Mauritius. II.—The Recovery of Adult *Schistosoma haematobium* after Development in *Bulinus (Pyrgophysa) forskali*.—*Ann. Trop. Med. & Parasit.* 1935. July 17. Vol. 29. No. 2. pp. 255-260.

The chain of infection has been completed from miracidium to cercaria in *Bulinus forskali* and from cercaria to fully developed *S. haematobium* in the mouse in Mauritius.

For the first links in the chain see this *Bulletin*, 1934, Vol. 31, p. 774. Adams at first made use of but few cercariae, not more than 500 and usually many fewer, and got no infection in guineapigs and mice (*Ann. Rep. Bact. Lab. Mauritius for 1934*). He makes note, too, of the fact that reading of work on the subject gives the mind the strong idea that overinfection of test hosts is the great danger in these tests. But when a clean laboratory-bred mouse was put in the way of infection for 2 hours at a time by all cercariae coming freely from specimens of *B. forskali* there was full growth of worms. The complete time was 24 hours in 12 days and the number of molluscs about 24. Natural death of the mouse took place after 4 months and there were got from it these rough numbers of male and female *S. haematobium*—from the liver and portal vein 60, from the mesenteric vessels 20, from the lungs 120. Males were about 12 times as many as females. The normal salt solution in which the parts were dissected had on centrifuging many typical eggs, from them came miracidia which in turn made their way into *B. forskali*. All worms in the mouse were of full development and had in all chief details the structure of *S. haematobium*.
C. L.

FAUST (Ernest Carroll). Some Newer Aspects of Schistosome Infection in the Western Hemisphere.—*Jl. Trop. Med. & Hyg.* 1935. Oct. 15. Vol. 38. No. 20. pp. 249-259. [76 refs.]

After a historical account of the species of molluscs in question, expression is given to the belief that bilharzia infection came to America in slaves and that the only "reservoir host" in the New World is the imported West African green monkey *Cercopithecus sabaeus*. The molluscs acting as hosts of the larvae are members of the genus *Australorbis*, this genus having as type *A. olivaceus* Spix, 1827, and as other species firstly *A. glabratus* (Say, 1818) with the synonym *A. guadeloupensis* Sowerby, 1821, secondly and possibly *Planorbis centimetralis* Lutz, 1918 and *P. antiguensis* Sowerby, 1877, the genus being exclusively American in distribution. A key is given to all Planorbidae. The known endemic foci are considered in detail and are—Northern Brazil, Venezuela, Dutch Guiana, St. Lucia, Martinique, Guadeloupe, Antigua, St. Kitts, Nevis, Montserrat, Vieques and Porto Rico; as to all others the statement is made that the presence of Mansonian schistosomiasis should be accepted in them only after the strongest evidence for it has been put forward. After consideration of the life-cycle and tissue changes, it is pointed out that the importance of the infection in public health can be known, and steps for its control can be undertaken, only after there is detailed

knowledge of the wideness and varying intensity of its distribution.

[The mollusc is cited in the paper as *centrimetralis*. The name was given by LUTZ in *Memorias do Instituto Oswaldo Cruz* 1918, Vol. 10 and both in the Portuguese version (p. 73) and the English one (p. 52) the spelling is *centimetralis*, which is therefore the valid name.]

C. L.

EL SALAM (A. Abd). **A New Antigen for the Diagnosis of Bilharziasis by the Complement Fixation Test.**—*Jl. Egyptian Med. Assoc.* 1935. May. Vol. 18. No. 5. pp. 353-355.

In this article the author makes a preliminary report on the antigenic properties of an extract of *Schistosoma bovis* worms which had been collected from the mesenteric veins of infected cattle, subsequently washed in saline, dried in an incubator at 37°C. for 48 hours and then kept in a desiccator over calcium chloride.

Two different extracts were tried :—

(1) An alcoholic extract made with 1 gm. of the worm powder extracted with 100 cc. of rectified spirit for 48 hours at room temperature and subsequently concentrated to half its bulk by means of an electric fan.

(2) A saline extract consisting of a 1 per cent. extract of powdered worms in 0.5 per cent. carbolic saline for 48 hours and subsequently cleared by centrifugation at 4,000 r.p.m. for 10 minutes.

Of 10 sera derived from patients containing eggs of *S. mansoni* or *S. haematobium* in their excreta, 9 gave positive complement fixation reactions with the saline extract, but all were invariably negative with the alcoholic extract. On the other hand 10 sera from cattle infected with *S. bovis* reacted negatively to both extracts.

Two strongly syphilitic sera from patients who had never suffered from bilharzia reacted negatively, as did 10 sera from persons harbouring intestinal parasites, but not infected with bilharzia.

Cholesterin reinforcement is stated to have enhanced the degree of fixation in bilharzia positive sera, but introduced an error inasmuch as syphilitic sera tended to react.

[The fact that the sera of patients infested with *S. mansoni* and *S. haematobium* reacted positively with an antigen prepared from an animal schistosome is in accord with the well established conception of the group nature of this reaction. That *S. bovis* antigen failed to react with the sera of animals harbouring its own parasite is surprising, but still more so is the uniform failure of an alcoholic extract of a schistosome to react with bilharzia infested sera when the corresponding saline extract was effective. This finding is contrary to the experience of other workers on this subject]. N. Hamilton Fairley.

NIEVA (Dominador E.). **Epileptiform Convulsions probably due to Schistosomiasis. (Report of a Case.)**—*Bull. San Juan de Dios Hosp. Manila.* 1935. July. Vol. 9. No. 7. pp. 234-237.

The striking finding in the stool examination was the presence of the ova of "*Schistosomum Haematobium*" in the stool of the patient, aged 39, of whom there is no note that he had ever been out of the Philippine Islands. He had also for a year had convulsive attacks about twice a week. He was given tartar emetic intravenously

and later emetine hypodermically and had no further convulsion during 2 months. Of the giving or not of sedatives nothing is said.

C. L.

MAINZER (Fritz). Sur la bilharziose pulmonaire, maladie des poumons simulant la tuberculose. [**Schistosomiasis simulating Pulmonary Tuberculosis.**].—*Acta Med. Scandinavica*. 1935. Vol. 85. No. 6. pp. 538-562. With 10 figs. [14 refs.]

A description of 5 cases of chronic infiltrative disease of the lungs, with mimicry of tuberculosis, and in addition a large spleen, eosinophilia, and cure by antimony. One of them had at the same time intestinal and urinary bilharziasis. The X-ray pictures are very good.

C. L.

CLARK (Eugene) & GRAEF (Irving). **Chronic Pulmonary Arteritis in Schistosomiasis Mansoni associated with Right Ventricular Hypertrophy. Report of a Case.**—*Amer. Jl. Pathology*. 1935. July. Vol. 11. No. 4 (65). pp. 693-706. With 2 plates. [17 refs.]

A Porto Rican negress of 21 with Mansonian schistosomiasis died of congestive heart failure and pulmonary arteritis, the intima of the pulmonary artery being slightly thickened with atheromatous plaques.

She left Porto Rico when 9 and had lived at New York since. At 14 palpitation and shortness of breath came on, and later ascites and oedema. The necropsy showed the signs of backworking with dilatation of the cavities of the right heart and a dilated pulmonary artery with the lesions noted. In the lungs were areas of marked congestion, granulomata often with giant cells in them surrounding ova, and the lesions secondary to a rise in arterial pressure. No Wassermann test was made. The reference under "Bey" is to S. AZMY, this *Bulletin*, 1932, Vol. 29, p. 411.

C. L.

MEDULLA (Candido). La fuadina nella cura della bilharziosi vescicale [**Fouadin in the Treatment of Urinary Schistosomiasis.**].—*Arch Ital. Sci. Med. Colon.* 1935. Sept. 1. Vol. 16. No. 9. pp. 658-663. With 1 fig. English summary (4 lines).

The patient, a man of 18 years, a native of Derna (Cyrenaica) suffered from painful micturition and haematuria 20 days after bathing in a stagnant pool near the Bu Mansur waterfall. Ova of *Sch. haematobium* were numerous in a centrifuged specimen of his urine. He was treated with fouadin injected intramuscularly on alternate days, starting with 1.5 cc., then 3.0, and then 5.0 cc. till cured. After the fifth injection blood was still present but ova were very scarce; after the seventh micturition was no longer painful, blood was not seen, nor ova in the centrifuged deposit.

H. H. S.

LEE (C. U.) & CHU (H. J.). **Simple Technique for studying Schistosome Worms in Vitro.**—*Proc. Soc. Experim. Biol. & Med.* 1935. June. Vol. 32. No. 9. pp. 1397-1400. With 1 fig.

"A simple technique is described for maintaining the life of adult schistosomes *in vitro* over a period of several weeks which, with frequent changes of medium, may be extended to 2½ months. This

is made possible by the use of small tissue culture flasks, which prevent bacterial contamination and desiccation of the media. The latter may be either horse, sheep or rabbit sera or human ascitic fluid."

The authors' description and figures make the steps of the procedure and the reasons for their use very clear. C. L.

LEE (C. U.) & CHUNG (H. L.). **Action of Various Organic Antimony Compounds on *Schistosoma japonicum* in Vitro.**—*Proc. Soc. Experim. Biol. & Med.* 1935. June. Vol. 32. No. 9. pp. 1400–1403.

Using the technique of LEE & CHU described above and sheep serum or ascitic fluid as the medium in which the worms were kept the authors come to these conclusions:—

"The lethal action of sodium antimonyl tartrate, fouadin, urea-stibamine and neostibosan on *Schistosoma japonicum* is studied *in vitro* and the results support the prevalent belief that the trivalent antimony compounds are more effective in the treatment of schistosomiasis than pentavalent salts and our own clinical experience that permanent cure of *Schistosoma japonica* results more readily with tartar emetic than with fouadin." C. L.

KHAW (O. K.). **Concentrated Fouadin in Treatment of Schistosomiasis Japonica in Rabbits.**—*Proc. Soc. Experim. Biol. & Med.* 1934. Dec. Vol. 32. No. 3. pp. 520–522.

A treatment by 6 weekly intramuscular injections of concentrated fouadin was given to rabbits as soon as eggs were seen in the faeces, the infection being deliberate. These are the details.

The rabbits weighed 1.5 to 2 kgm., the drug is antimony III-pyrocatechin-disulphate of sodium and calcium, there being 14.3 mgm. of Sb III and 7 mgm. of calcium in every cc. The doses were 0.15, 0.25, 0.3, 0.3, 0.3 and 0.3 cc. Of 20 treated 14 were cured, 1 was uncured and 5 died. Of those who died only one had a complete treatment; the livers showed more general fatty change than did the untreated controls. Of the 7 untreated controls 5 died and 20 to 50 per cent. of eggs in their tissues were dead. C. L.

CAWSTON (F. G.). **The Control of Bilharzia Infection in the Union.**—*South African Med. Jl.* 1935. Aug. 10. Vol. 9. No. 15. pp. 519–520.

The paper's title is the measure of its scope.

For "species sanitation" there must be identification of species, in other words co-operation of conchologist and sanitary officer; and here the coming of Major CONNOLLY's final report will be of great value. Cawston is unable to distinguish between *S. haematobium* and *S. mansoni* in their adult or cercarial stages, only the eggs being, he holds, different. The optimum habitat of *Physopsis* is the under surface of the smooth leaf of the "light blue water lily or the broad-rush" but the molluscs have a loose hold on the leaf and easily fall off. In discussion on the distribution of the molluscs it is noted that *Physopsis globosa* is in the Union a carrier of *S. bovis* as well as of *S. haematobium*. "This ovine [*sic*] parasite is readily distinguished, for the adult worms possess only 3 glands and the ova are long and spindle shaped." Drying is believed to put to death

old molluscs more easily than young ones, but increase of transport and introduction of water plants has brought about a spread of the disease.
C. L.

CAWSTON (F. Gordon). A Consideration of the Antimony Content in Drugs used for the Destruction of Schistosomes.—*Jl. Trop. Med. & Hyg.* 1935. July 15. Vol. 38. No. 14. pp. 169-170.

HUNNICUTT (Thomas N.), Jr. An Anemia associated with a Fish Tapeworm (*Diphyllobothrium latum*) Infestation.—*Jl. Amer. Med. Assoc.* 1935. June 1. Vol. 104. No. 22. pp. 1984-1986. With 1 chart.

An immigrant from Finland, in the United States since 1921, had anaemia cured by liver treatment, cure maintained by passage of tapeworms.

The blood cells were 1,370,000 and 4,600, Hb. 34 (Sahli), reticulocytes 0.6 and eosinophils 1.5 per cent., marked anisocytosis, poikilocytosis, "3 normoblasts and 1 megaloblast." He was given "liver extract" parenterally into the glutei in maximum doses for 10 days and thereafter "capsules of liver-stomach concentrate" for 4 months. In 8 weeks he had a normal blood. Five months after he was first seen he was given male fern, passed 4 worms and segments of others and was found dewormed a month later. His blood values continued to be good.
C. L.

PETRUSCHEVSKY (G. K.) & BOLDYR (E. D.). Propagation du bothriocéphale (*Diphyllobothrium latum*) et de ses larves plerocercoides dans la région du Nord-Ouest de l'U.R.S.S. [**Spread of *Diphyllobothrium latum* and its Larva in U.S.S.R.**].—*Ann. Parasit. Humaine et Comparée.* 1935. July 1. Vol. 13. No. 4. pp. 327-337. [25 refs.]

A paper of great local importance since it gives a list of all Baltic fish parasitized with plerocercoids of *D. latum*, with the degree of infection organ by organ.
C. L.

WOODBURY (Lowell A.). Infectivity of the Plerocercoids of *Diphyllobothrium cordiceps* (Ledy) for Man.—*Jl. Parasitology.* 1935. Aug. Vol. 21. No. 4. pp. 315-316.

Woodbury has not been able to cause infection of himself though in 2 groups of tests he swallowed plerocercoids of *D. cordiceps*.

These plerocercoids are the cause of a wormy state in the flesh of the Yellowstone Lake trout *Salmo levis*. SKINKER (*Jl. Parasit.*, 1932, Vol. 19, p. 162) has seen no difference between the strobiles of *D. latum* and *D. cordiceps*, so Woodbury makes the suggestion that here is a "physiological species."
C. L.

IWATA (Seishun). Some Experimental Studies on the Regeneration of the Plerocercoid of Manson's Tapeworm, *Diphyllobothrium erinacei* (Rudolphi), with Special Reference to its Relationship with *Sparganum proliferum* Iijima.—Reprinted from *Japanese Jl. Zool.* 1934. Sept. Vol. 6. No. 1. pp. 139-158. With 43 figs. [33 refs.]

After transplantation of injured plerocercoids of *D. erinacei* there were seen branched forms, but though they had the same morphology

as *S. proliferum* the conclusion that the two species are the same is not safe.
C. L.

HUNNINEN (Arne V.). **Studies on the Life History and Host-Parasite Relations of *Hymenolepis fraterna* (*H. nana*, var. *fraterna*, Stiles) in White Mice.**—*Amer. J. Hyg.* 1935. Sept. Vol. 22. No. 2. pp. 414-443. With 2 charts & 7 figs. [11 refs.]

By a special method the cysticerchi in the villi were counted, while eggs were tested by smear and D.C.F. In these ways conclusions were come to regarding the life history. The technique is as follows :

"The entire small intestine was placed in tap water in the ice-box overnight. The next day the mucus could be removed by shaking the intestine in water. The intestine was then cut into convenient lengths and spread in a Petri dish with the tips of the villi up. Just enough water was added to . . . cover the intestine. The cysticercoids could then be counted directly with the aid of the medium power of a dissecting microscope."

Infected and non-infected mice lived together and watch was kept on them till they died. Since eggs are infective when passed, since mice eat faecal pellets, since the latent period before the new strobiles produce eggs is 14 to 20 days and since 6 of 9 negative mice began to pass eggs 14 to 29 days after being put with infective ones, they must have become infected at once. In the absence of reinfection, infection continued for 2 to 56 days. But when conditions were those making for natural reinfections there became evident a resistance to infection shown by egg-negative periods, by fewer eggs when they were present, and finally after 100 days by complete absence of eggs for long periods. This was not due to any loss of coprophagic habit, for artificial infections also failed at this period. Two other curious immunity features were seen. Two to three days after giving birth to a litter she-mice lost their infections, becoming negative to D.C.F. ; again 3 mice which had passed no eggs for 252, 255 and 329 days began to do so, and then died in 17 to 60 days. Nearly all cysticercoids are in the first half of the intestine. Of eggs given in food to mice, up to at least 55,000, only 4.1 per cent. become cysticercoids, and similar percentages show that nearly all cysticercoids become adults. About 35 per cent. of eggs fed to a mouse are passed *per anum*, many of them viable. There is full development of cysticerchi in 93 to 96 hours, though suckers appear before hooks. Tests on 47 mice and 26 rats fed with known numbers of eggs show that up to 102 hours there is no drop in the numbers of cysticercoids in villi ; at 115 hours these drop to one-third, at 144 hours there were few or none in villi. With a single infection there is retardation of growth of some strobiles so that when those whose development has been rapid die, the others grow ; thus with a short adult life for each strobile there may be a long infective period for the host. Immunity to a second infection shows itself in the number of cysticercoids which develop, but whether its cause is in the earlier cysticercoids or in adults is unknown. A dose of 250 to 500 eggs was enough to give immunity against a second infection. There is age resistance under 1 and over 5 months of age. [See also this *Bulletin*, 1924, Vol. 21, p. 551 ; 1925, Vol. 22, p. 478.]

C. L.

DEW (Harold R.). Advances in Our Knowledge of Hydatid Disease during the Twentieth Century.—*Brit. Med. J.* 1935. Oct. 5. pp. 620-622.

There must be no complacency, with failure to advance knowledge of this subject. Advance is needed in spite of the additions to our knowledge during the last 35 years.

Australian surgeons had long maintained that secondary infections could take place when a primary cyst was opened; of this Dévé gave the proof, and the knowledge has made surgery quite different. Dew's report of the first alveolar hydatid in Australia wrecked the main and geographical argument of those whose belief was that it and ordinary hydatid are different animals. On the pathology of special organs it is remarked that in about three-fourths of cases it is some leakage which causes the patient to see a doctor; and that there is not enough knowledge of the rate of growth of cysts, their primary position in the young, and the numbers and sorts of complications. X-rays and immunological tests have completely altered diagnosis. Treatment is still surgical and formalinization has made it much simpler; there is still uncertainty on the best line of operation for a deep cyst of the lung, the cerebral cyst has its special difficulties, and the question of exploring the common bile duct in intrabiliary rupture will always be difficult.

C. L.

BARNETT (L.). A Department for Hydatid Disease Research and Prevention.—*New Zealand Med. J.* 1935. Aug. Vol. 34. No. 182. pp. 258-260.

Officials of the New Zealand Agricultural Department from records kept of slaughter-house findings have reported that hydatid cysts were present in lungs or liver or both organs in 5 per cent. of lambs and calves and up to 50 (in some districts as much as 90) per cent. in aged animals. The author estimates that at the present time some ten million of the New Zealand sheep are infested.

The prevalence of hydatid disease in man, though diminishing in some parts of the country, is still fairly common in others. Apart from cases among private practitioners about a hundred are treated in hospitals, more in the South Island. By way of propaganda a Hydatid Poster has been printed and widely distributed at post offices, schools, county council and borough meeting rooms, abattoirs, shearing sheds, etc. Now, a department for research on and prevention of the disease has been inaugurated at the Medical School of Otago University to investigate the biological, pathological and clinical aspects of the subject.

H. H. S.

SCHMIDT (K.). Die Echinokokken-Krankheit in Palästina. [Hydatid Disease in Palestine.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Nov. Vol. 39. No. 11. pp. 453-464. With 1 fig.

Hydatid infection is a serious problem in Palestine.

Since 1922 there have been 129 cases of hydatid cysts admitted to hospitals in Palestine. The cause is easy to see, for about 70 per cent. of the sheep and 40 per cent. of cattle in the slaughter houses are infected and the condemned material is not properly disposed of, so that jackals as well as dogs are concerned in the spread of the infection.

C. L.

CLAESSEN (Gunnlaugur). **On Echinococcus in the Lung.**—*Acta Radiologica*. 1935. Sept. 15. Vol. 16. No. 5. pp. 601-615. With 9 figs. (8 on 2 plates).

Hydatid cysts of the lung, not liver cysts which have made a passage through the diaphragm into the lungs, are rare in Iceland, 1.5 per cent. of 682 cases.

This figure is in contrast to the 18 to 25 per cent. present in Australia in Dew's belief, and Claessen holds that knowledge needs to be filled in on this point and on others. One of these is possible carriage by air, a method favoured by Australian writers, yet Iceland farmers feed their stabled animals indoors with dry taenia-infected hay. A full description with beautiful X-ray pictures is given of a pulmonary case in which, after the host tripped, there was a burst into a bronchus, so that death from suffocation almost came about. While the cavity did not empty it did not become septic and its position having been seen by X-rays it was drained through the thoracic wall. It is noted that in the lung the cyst is rarely old before it bursts and for that reason the fibrous reaction to it is rarely great and the formation of daughter cysts is equally rare. Natural healing with expectoration of the contents is common. In an earlier lung case of the author's followed for 14 years no secondary cysts were ever seen. C. L.

DANG (Jemadar Manohar Lal). **An Unusual Site for a Hydatid Cyst.**—*Indian Med. Gaz.* 1935. Oct. Vol. 70. No. 10. p. 566.

A Sikh, aged 23 years, came to hospital with a small swelling just below the angle of the left jaw. It had been increasing gradually for a year and a half. It was thought at first to be glandular, but no others were affected, and the swelling was noticed to be fairly mobile and cystic, although extending fairly deeply. At operation it proved to be a hydatid cyst about as large as a hen's egg, beneath the deep cervical fascia and lying on the left submaxillary gland.

H. H. S.

TURNER (Edward L.), DENNIS (E. W.) & BERBERIAN (D. A.). **Studies on the Production of Artificial Immunity against *Echinococcus granulosus* in the Definitive Host. (The Results of Four Years Investigation of this Problem.)**—*Jl. Egyptian Med. Assoc.* 1935. Aug. Vol. 18. No. 8. pp. 536-546.

The authors report that some immunity has been obtained in the dog to infection with *Echinococcus granulosus* by injection of an antigen obtained from hydatid cysts.

The work comes from the American University of Beirut, Syria. About a quarter of the street dogs have the strobile. Those used for testing were believed to be clean. From 3,000 to 50,000 scolices were given in food to 19 controls, 18 became infected, 13 heavily so. Six dogs had 5 injections of 1 per cent. phenolized antigen made from the cuticular and germinating membrane of sterile cysts; when fed, 21 to 27 days later, with 1,000 to 10,000 scolices, 3 were negative, 2 were heavily infected and the sixth was judged to have been infected before. Thirty-two dogs were given 2 to 5 injections of a 1 per cent. suspension of scolices and membrane from fertile cysts, 17 became infected, 15 free from infection after being fed with "infected

material" at an interval of 6 to 122 days after the last injection. Twenty-three dogs were given 1 to 5 doses of antigen, being a suspension of 1,000 to 20,000 scolices from fertile cysts, and fed with infective material 4 to 238 days after the last injection, and autopsy was made 24 to 131 days later; 10 had no infection and 5 had heavy infections. The Casoni reaction was useless in determining whether a dog had the tapeworm. C. L.

DIXON (H. B. F.) & SMITHERS (D. W.). **Cysticercosis (*Taenia solium*)**. —*Jl. Roy. Army Med. Corps*. 1935. Apr., May, June, July & Aug. Vol. 64. Nos. 4, 5 & 6; pp. 227-234; 300-306; 375-380; Vol. 65. Nos. 1 & 2. pp. 28-34; 91-98. With 10 figs. [68 refs.]

A valuable collection of knowledge on this subject set out clearly. It will no doubt be in constant reference in the future. The authors' conclusions are these:—

"(1) Cysticercosis (*Taenia solium*) is a disease far from uncommon, especially in those who have lived in countries where sanitation is defective.

"(2) It is deserving of more recognition than it now obtains in medical and neurological textbooks, as its manifestations are both varied and variable.

"(3) The older descriptions of the disease are misleading in that any case may present various symptoms at different stages of the disease, and if the case is followed up to the end mental and/or nervous symptoms almost invariably occur.

"(4) Any patient previously healthy who develops fits or anomalous nervous or mental symptoms, and who has lived abroad, should be suspected of suffering from cysticercosis until proved otherwise.

"(5) Unless evidence of cysticercosis is systematically sought for the diagnosis may be missed, as the subcutaneous nodules which are suggestive of the disease may be absent at the time of the examination, only to come out in crops at a later date, remaining for a varying period of time and then disappearing, and radiological evidence may not be convincing for some years, as calcification does not usually take place until some four or five years after infestation.

"(6) Every case suspected of cysticercosis should be re-examined at six-monthly or yearly intervals for the presence of subcutaneous nodules and calcification of cysts in the soft parts.

"(7) There is no known treatment for the disease. Administration of luminal and bromides keeps the fits in check in some cases.

"(8) The prognosis is bad.

"(9) There is every reason to believe that prophylactic measures properly applied would considerably reduce the incidence of the disease which has decreased in most countries with the advance of modern sanitation and hygiene."

C. L.

GRADO (Giuseppe). Cisticercosi muscolare disseminata. [**Disseminated Muscular Cysticercosis.**]—*Riv. Sanitaria Siciliana*. 1935. May 15. Vol. 23. No. 10. pp. 742-744, 747-752, 755-757. With 6 figs. French summary (8 lines).

Two cases of cysticercosis are described, both women, one aged 43, the other 34 years. The former had been treated 4 years previously for taeniasis and the worm was expelled and she had seen no fragments since. During the past year, however, she suffered from pains in the legs, cramps and formication. X-rays revealed numerous small opacities of calcified cysticerci in the muscles of the back, arms and

legs, while in the second patient, though in fair numbers, these were much fewer than in the first. Neither presented any sign of epilepsy or cerebral involvement such as has been described by MACARTHUR.

H. H. S.

CHUNG (H. L.) & LEE (C. U.). *Cysticercosis cellulosa in Man with Special Reference to Involvement of Central Nervous System.*—*Chinese Med. Jl.* 1935. May. Vol. 49. No. 5. pp. 429-445. [20 refs.]

A study of 10 more cases of cysticercosis of the central nervous system.

Detailed accounts of the cases and their symptoms and cerebrospinal findings are put out in tables. Palpable subcutaneous nodules were present in 8, in the other two they were seen in the brain at operation or necropsy; epileptiform fits in 8, headache in 6, numbness or paresis in 5, fever in 5, nausea and vomiting in 4, transient motor aphasia, blurred vision, dizziness, drowsiness, or eosinophilia in 3. There was a tapeworm in 4, leucocytosis in 6, and bilateral papillitis with or without other signs in the fundi in 3. A condition of exophthalmic goitre in one was put down to cysticerci in the thyroid. As to the cerebrospinal fluid, the pressure was between 80 and 350 mm. of water, leucocytes between 2 and 440 in the csm., neutrophils in the same from 0 to 47 and lymphocytes from 53 to 100 per cent.

C. L.

LINDEMAN (S. J. L.) & LYBURN (R. St. John). *Notes on Two Cases of Epilepsy due to Cysticercosis, with Other Suggestive Cases.*—*Jl. Roy. Army Med. Corps.* 1935. Aug. Vol. 65. No. 2. pp. 116-123.

There is description of 8 cases in all in a battalion which had come to Khartoum from India.

Two patients had fits with cysticerci, 4 had nervous symptoms without cysticerci, and lastly two had cysticerci whose discovery took place when every soldier was examined as the result of the finding of the other 6 cases.

C. L.

DOGRA (J. R.) & AHERN (D. M.). *A Case of Cysticercosis.*—*Indian Med. Gaz.* 1935. Sept. Vol. 70. No. 9. p. 510.

Fits and nodules. Excision of a nodule made the diagnosis certain.

C. L.

MATSUURA (Toshio). *Ein Fall von Cysticercus Cellulose Hominis*—*Jl. Oriental Med.* 1935. Sept. Vol. 23. No. 3 [In Japanese pp. 627-629. With 1 plate. [12 refs.] German summary p. 36]

OCHOTERENA (I.). *Contribución para el conocimiento de la histopatología de la cisticercosis cerebral humana en México.* [*Histopathology of Cerebral Cysticercosis in Man in Mexico.*]—*An. d. Inst. Biol. Mexico.* 1935. Vol. 6. No. 2. pp. 79-88. With 10 figs. English summary (4 lines).

Owing to the slow evolution of the cyst the cysticercus becomes enclosed in a chitinous capsule with a surrounding zone containing

many leucocytes, lymphocytes and granulocytes, epithelioid cells, macrophages, and products of degeneration, fatty corpuscles, etc., at times disposed in rosette form. Outside this are collagen and elastic fibres, together with monocytes, epithelioid cells, eosinophiles and above all plasma cells which may be so conspicuous as to merit the term plasma cell layer. Morula cells are also seen and are well depicted in one of the photomicrographs illustrating this article. The vessels show marked endarteritis. The necrotic nerve tissue is circumscribed by a barrier of neuroglia. The general appearance of the lesions set up bears a marked resemblance to those of general paralysis. It may be noted further that the cerebrospinal fluid of these cases has been reported to give a positive Wassermann reaction. H. H. S.

TRAWIŃSKI (A.) & ROTHFELD (J.). Ueber Anwendung der Präzipitationsreaktion zum Nachweis der Gehirnzystizerkose beim Menschen. [**Precipitin Reaction in Diagnosis of Cysticercus of the Brain.**—*Zent. f. Bakt. I. Abt. Orig.* 1935. Sept. 5. Vol. 134. No. 7/8. pp. 472-474.]

Precipitin reaction proved itself specific for cysticercus of the brain.

Of the 4 cases one was verified at necropsy, a second had cysticerci in the skin, in the third the diagnosis was probable and in the fourth a positive precipitin reaction was the only suggestion of a cause for the fits. The reagent was formed by dried scolex from a cysticercus diluted with 500 times the amount of normal saline. C. L.

KERR (K. B.). **Immunity against a Cestode Parasite, *Cysticercus pisiformis*.**—*Amer. Jl. Hyg.* 1935. July. Vol. 22. No. 1. pp. 169-182. [10 refs.]

Active and passive immunity to infection by the cysticercus has been effected by injections of material got from the strobiles of *Taenia pisiformis*.

In 35 rabbits injections were made (under the skin or into veins or peritoneum) of material from fresh or dried worms. When these rabbits were then given meals of hundreds of oncospheres there were no cysticerci to be seen on the outsides of their livers in 34 of them. One infection gave a measure of active immunity against a second one, and injection of serum from a rabbit which had infection into one which had not (at the rate of 2 per cent. of body weight) gave the second some immunity amounting to 4 of 8 animals in one experiment. C. L.

AFRICA (Candido M.) & GARCIA (E. Y.). **The Occurrence of *Bertiella* in Man, Monkey and Dog in the Philippines.**—*Philippine Jl. Sci.* 1935. Jan. Vol. 56. No. 1. pp. 1-10. [16 refs.]

Comparison is made of *Bertiella* species from a Filipino child, a Philippine dog, and a Philippine monkey (*Macacus cynomolgus*).

The dog is a new host and the Philippines a new land for this genus. There is a full description and fine illustrations of the specimens. The case in the child makes the 10th reported in man, nearly all in children; and the name *B. stuederi* (synonym *B. satyri*) is kept until the synonymy of the species has been gone into, while the differences between this specimen and others are given in detail. C. L.

ADAMS (A. R. D.). **A Fourth Case of Human Infestation with *Bertiella studeri* (Cestoda) in Mauritius.**—*Ann. Trop. Med. & Parasit.* 1935. Oct. 5. Vol. 29. No. 3. pp. 361–362.

"A fourth Mauritian case of human infestation with *B. studeri* is recorded. The patient, a Hindu boy, aged 7, was in perfect physical and mental health, in spite of his infestation. Treatment with carbon tetrachloride resulted in dislodgement of the worm. Direct feeding of gravid segments, both freshly-passed and after keeping for some days, to a young *M. cynomolgus* failed to cause parasitization of the animal."

[The head was not found but no segments were being passed three months later.] C. L.

SCHMID (Felix). Beitrag zur Technik der helminthologischen Untersuchung. [**Contribution on the Technique of Examination for (Nematode) Worms.**]—*Zent. f. Bakt.* I. Abt. Orig. 1935. June 14. Vol. 134. No. 3/4. pp. 150–151.

A method for the collection of small nematodes from the contents of the gastro-intestinal canal.

First there is dilution of the contents with 1 per cent. soda solution, next stirring of this with a rod of glass or wood, round which these worms become wound. They are unwound by movements of the rod in normal salt solution and may then be seen by the naked eye. C. L.

TAYLOR (E. L.). **Do Nematodes assist Bacterial Invasion of the Host by wounding the Wall of the Intestinal Tract?**—*Parasitology.* 1935. May. Vol. 27. No. 2. pp. 145–151.

No! is the general answer to the question in the title.

The work carries on that of Taylor and PURCHASE (this *Bulletin*, 1932, Vol. 29, p. 61). *Bact. suispestifer* was the organism which was used in testing the passage of bacteria into the rabbits' blood from the intestine. In the first test 12 rabbits were given an infection with *Graphidium strigosum*, a blood sucker, and 12 were not; all were then given by stomach tube 0.01 cc. of a 24 hours broth culture of virulent *Bact. suispestifer*. Of those with *G. strigosum* infection 9 died and of those without 8; but 21 of them had also infections with the oxyurid, *Passalurus*. In the second test 27 rabbits were given infection with *Trichostrongylus retortaeformis*, a blood sucker and 24 were not; all were given by stomach 0.003 cc. of a like culture; of those with *T. retortaeformis* there was death in 18, of those without 17. C. L.

DE BOER (E.). Experimenteel onderzoek betreffende *Ascaris lumbricoides* van mensch en varken. [**Experimental Study of *Ascaris lumbricoides* in Man and in the Pig.**]—*Tijdschr. v. Diergeneesk.* 1935. Sept. 15. Vol. 62. No. 18. pp. 965–973. English summary.

The author's investigation was undertaken to solve the question of identity or not of the ascaris infesting man and that of the pig, and to determine the proportion of pigs infested with its own ascaris. He used young animals, some fed normally, others on a diet poor in vitamin A. The following series of experiments were performed: (1) Single feeding with eggs of *A. lumbricoides* from the pig (11 animals); (2) With eggs of human *A. lumbricoides* (5 animals); (3) Eight times

in successive weeks as in (1) (7 animals) ; (4) Seven times in successive weeks as in (2) (6 animals).

His findings may be summed up as follows: Repeated infection of piglets with ova of the human or the pig ascaris led to the presence of adult worms in the experimental animals, though neither natural nor experimental feeding with the ova invariably gave this result. Change of diet to vitamin A deficiency did not appear to affect this. The time for development from embryonated egg to adult worm was about 2 months.

Examination of earth worms (*Lumbricus terrestris*) living in ascaris-infested soil revealed ova of the latter in the intestine of the former, and the author suggests that earthworms may play a part in ascaris infestation [but what part he does not specify]. H. H. S.

JONES (T. L.) & KINGSCOTE (A. A.). **Observations on Ascaris Sensitivity in Man.**—*Amer. Jl. Hyg.* 1935. Sept. Vol. 22. No. 2. pp. 406–413.

The fact of ascaris sensitivity particularly in those who have worked with the worm is confirmed.

"Twenty-seven out of 108 subjects, mostly veterinary undergraduates selected at random, gave positive reactions to a scratch-test with 5 per cent. saline extract of pig ascaris. A period of exposure seems to be a necessary precursor and continued re-exposure may lead to at least partial desensitization. Various fractions of ascaris were similarly tested. In some subjects an eosinophilia followed the reaction

"A positive reaction is no indication of previous infection, although previous exposure by contact may be necessary. Continued exposure does not necessarily cause sensitization however." C. L.

MCRÆE (Anne). **The Extra-corporeal Hatching of Ascaris Eggs.**—*Jl. Parasitology.* 1935. June. Vol. 21. No. 3. pp. 222–223.

"The writer feels that the many reports of the hatching of ascaris eggs have been misleading, i.e., that the 'hatching' is evidently the effect of external conditions probably in most cases mechanical injury to the egg shell and should not be interpreted as biological hatching of the eggs."

The eggs of *Ascaris lumbricoides* from the pig were used. There was almost no "hatching" in 2 per cent. formalin, on changing from 0.2 per cent. HCl to 0.5 per cent. NaHCO₃ at 30° or 37°C., or on alternation between 0°C. and 40°C. Sometimes "spontaneous" hatching in cultures took place, once on a great scale when a sand culture was taken some hundreds of miles by car; the probable explanation being that this was the effect of the rubbing of sand grains against the eggs. Tests showed that there was "hatching" even to 80 per cent. in 10 minutes when embryonated eggs were stirred in wet sand or when there was shaking with shot or beads. This kind of hatching came about more readily when there had been solution of the outer shell by antiformin. Freed larvae were dead within two days even in Ringer's solution at 37°C. [It seems strange that the paper has no mention of the work of BROWN, which too was done at the School of Hygiene and Public Health, of the Johns Hopkins University (this *Bulletin*, 1929, Vol. 26, p. 548). In his experience all eggs "hatched" when wetted after drying, another and seemingly the most important physical cause for this, and one which may have acted in McRæe's cases of "spontaneous" hatching.] C. L.

INDIAN MEDICAL GAZETTE. 1935. June. Vol. 70. No. 6. pp. 333-334.—**Ascaris Infection and the Bore-Hole Latrine.**

After discussion on the necessity for sanitation in putting an end to ascaris infection, and on the reviewer's opinion, formed from the facts, that carriage of this infection may be by air, the author gives reasons for his belief that the bored hole latrine is the kind "most likely to be successfully used by primitive peoples."

Experience having made it clear that deworming without good sanitation sees a treated man with the old weight of infection back again within three months, right sanitation is clearly the key of the question. "Recently Clayton Lane has collected one or two records which indicate the possibility that imperfect sanitary measures actually lead to an increase in infection rate with ascaris . . . the two principal instances quoted by Lane are one of his own finding in the Darjeeling district some years ago and the other in some small villages in Panama. . . . Clayton Lane suggests that the ascaris eggs are air-borne and enter the houses to contaminate the food." [After making the statement that this suggestion came in fact from Stiles, the reviewer under the heading "Breathing in of embryonated eggs" said "But what is here in mind is infection by inspiration, the breathing in of embryonated eggs as dust."] "But this suggestion seems of doubtful accuracy, in Panama at all events, for there the rise in infection rate occurred at the height of the wet season." [In Panama CORT *et al.* gave these egg counts for "sanitized" Sardina: July, 1926, 23,190; August, 1926, 7,170; September, 1926, 15,830; February 1927, 48,540; (this *Bulletin*, 1930, Vol. 27, p. 421). And again, "There are two seasons in Panama, the dry from January to April and the rainy from April to December (CORT *et al.* this *Bulletin*, 1930, Vol. 27, p. 431)]. "If air-borne carriage of eggs after the installation of inadequate latrines is the correct explanation of the failure to reduce or to even cause an increase in ascaris infection, the bore-hole latrine should not be open to this objection, especially if bored deep enough to enter the sub-soil water, a condition which will apply in the plains of Bengal and Assam. . . . If bore-hole latrines reach the sub-soil water and not too many individuals use each one complete liquefaction of faeces will occur and the liquefied matter will percolate through the soil and so be completely lost." [A bored hole latrine is only a pit latrine made in a special way, 18 inches wide often with a lining of basket work, but entering the subsoil water. If the user is marksman enough to hit the water at the bottom, perhaps thirty feet away, he pollutes the general and moving subsoil water, the drink of most persons in the tropics. If he has the usual half-liquid stool of these parts the shrapnel effect will spatter the walls of the tube up to within a few inches of its top, from which place air carriage should take place readily if it can take place at all.]

C. L.

NAIR (P. Kumaran). **An Epidemiological Study of Ascaris, Trichuris and Hookworm in a Coastal Village in Puerto Rico.**—*Puerto Rico Jl. Public Health & Trop. Med.* 1935. Sept. Vol. 11. No. 1. pp. 118-138. With 4 figs. & 1 plan. [Spanish version pp. 139-157.]

A study of the infections mentioned in the title made during the summer of 1932 at Salinas on the south coast of Porto Rico.

The soil is sandy, the rainfall less than 45 in. yearly, there is much irrigation, large areas of land are below high tide level and the soil is believed to have a high salt content. There are 73 families mostly white, and all are very poor. Egg counts were made of 299 out of 362 persons using 0.005 gm. of faeces. In only 4.6 per cent. were hook-worm eggs seen [an obvious understatement], 73 per cent. harboured trichuris with an average count of 4,500 eggs to the gram, the figures for ascaris being 44.6 and 19,200. Graphs show the distribution by age and sex. Of the 73 families 59 took water from the city the others from a protected deep well proved free from pollution—23 families had latrines, 16 kept them clean and used them, most persons old and young went out to defaecation sites. In the map one of them bears the legend "defecation spot and playground for children" and the text says of it that it "formed a big common backyard for the houses, where children played and defecated alternately and indiscriminately." Twelve backyards had no soil pollution but embryonated ascaris eggs were found in soil samples from five of them. Most families with a low degree of ascaris and trichuris infection lived at some distance from the defaecation sites. Of 20 families free from ascaris infection soil pollution of yards was absent in 19, and such pollution is held to be the chief cause of infection. C. L.

CALVO FONSECA (R.), KOURI (Pedro) & BASNUEVO (Jose G.). Porcentaje y distribución geográfica del parasitismo intestinal en Cuba. (Provincia de Pinar del Río.) [Intestinal Parasitism in the Province of Pinar del Río (Cuba).]—*Rev. Parasit., Clin. y Lab.* Habana. 1935. Nov.-Dec. Vol. 1. No. 2. pp. 206-211.

Altogether 986 faecal examinations were made [the population of the district is not mentioned, but the latest figures obtainable are 301,000 in June 1928] and 612 or nearly two-thirds (62 per cent.) contained parasites, protozoal or helminthic. Protozoa only were seen in 64 (6.5 per cent.); worms only in 440 (44.6 per cent.) and both in 109 (11.0 per cent.). The detailed distribution in 14 townships of the Province is given in a table. The commonest was Trichuris, found in 400 of the total (40.5 per cent.), then in order Ascaris 23.5 per cent., Necator 15.4, Enterobius 1.9, *Taenia saginata* 0.4 per cent. (4 cases only). Trichuris and Ascaris were both present in 96 or 9.7 per cent., Trichuris and Necator in 4.5 and all three in almost the same proportion, 4.4 per cent.

More attention was given to search for helminthic infestation than for protozoa, but the fact is mentioned that *E. histolytica* was found in 6, Giardia in 26, and *E. coli* in 146. "Although we know that *E. nana*, *Chilomastix mesnili*, *Trichomonas hominis* . . . are fairly common in Cuba, we did not look particularly for them . . . our investigations being concentrated on searching for worm infestation." H. H. S.

KIRK (J. Balfour) & CANTIN (A. Y.). Intestinal Obstruction by Round-worms following Administration of an Anthelmintic.—*Brit. Med. J.* 1935. Aug. 17. pp. 298-299.

Another case of intestinal obstruction from a knot of ascarids.

A boy of 10 had severe colic after "he had taken a mixture of chenopodium and castor oils," and at operation the usual "bag of worms" was found and emptied. Cases in the literature are cited. From their rarity the suggestion is made that not only worms and anthelmintic but some third factor is necessary. C. L.

ROTTER (Werner). Zur Frage der Auswanderung von Spulwürmern durch die gesunde Darmwand. [**Penetration of the Healthy Intestinal Wall by Ascaris.**—*Muench. Med. Woch.* 1935. Oct. 11. Vol. 82. No. 41. pp. 1640–1641.]

Rotter's belief is that ascaris can force a passage through the healthy intestinal wall.

The case in question was a child of 3 with inflammation of the abdominal wall. At necropsy the jejunum and first part of the ileum formed a sort of sausage filled with 200 ascarids. In the first part of the jejunum was a perforation about 1 cm. across, the mucosa undermined, the hole in the muscle oblique and surrounded by a fibrotic mass and showing the muscle fibres torn apart with much polymorphonuclear leucocytosis. There was a haemorrhage about the left suprarenal, and small ones in the lungs in which no ascaris larvae were seen. C. L.

UJIE (Naoki). **A Case of Empyema caused by Heterotopic Parasitism of an Ascaris lumbricoides.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1935. Sept. Vol. 34. No. 9 (366). [In Japanese pp. 1390–1395. [54 refs.] English summary pp. 1396–1397. With 2 figs. on 1 plate.]

Ascaris infestation is very common throughout Japan and the author states that he has collated records up to the end of 1934 of 207 cases of ectopic parasitism by this worm. Only 6 of these were instances of invasion of the pleura. He now places on record another, a boy of 3 years operated upon for empyema. On the third day after operation a mature but small female *Ascaris* emerged from the wound. The worm was only 16 cm. long but there were many fertilized ova in its uterus. Professor YOKOGAWA gave his opinion as follows: "It seems likely that this worm attained sexual maturity in the intestinal tract and after copulation escaped from there and strayed into the pleural cavity, probably a month previous to the operation. In these abnormal surroundings further growth of the body has been arrested but development of the generative organs continued until ability to oviposit was reached." In the pus were also *Bact. coli* and *Staph. aureus*.

H. H. S.

ZWIRN (D.), JOYEUX (Ch.) & ABOUCAYA (A.). *Ascaris lumbricoides* dans la cavité pleurale au cours d'une pleurésie purulente. [**Ascaris lumbricoides in an Empyema.**—*Marseille-Méd.* 1935. June 5. Vol. 72. No. 16. pp. 701–715. With 4 figs.]

When an empyema was opened, a dead male ascaris came out with the pus. In the faeces were eggs of ascaris and trichuris. C. L.

DE AZEVEDO (A. Penna). Ascariidiose hepatica. [**Ascaris lumbricoides in the Liver.**—*Mem. Inst. Oswaldo Cruz.* 1935. June. Vol. 30. No. 1. pp. 115–122. With 6 plates. [17 refs.] English summary.]

The author describes a case of liver ascariasis in a girl, 1 year old, who also presented intestinal parasitism by 54 adult specimens of *Ascaris lumbricoides*.

"The hepatic lesions consisted in several abscesses containing living adult worms along with dead specimens and in the formation of an inflammatory condition with pronounced production of fibrous connective tissue and lymphocytic infiltration. Special attention is attracted by the fact of the existence of numerous eggs of *Ascaris lumbricoides* in the innermost of the inflammatory tissue. The inflammatory foci met with are closely connected with the biliary ducts; the presence of eggs of *Ascaris lumbricoides* is found even within the epithelium. Apart from the zones affected by the process of ascaridiasis, the hepatic tissue is seen to be well preserved."

C. L.

STANNUS (Hugh S.). **An Ascaris Infection. A Case in which the Diagnosis and Cure were effected by Mistake.**—*Post-Graduate Med. Jl.* 1935. July. Vol. 11. (New Ser.) No. 117. pp. 247-248. With 1 chart.

The mistake was a needling of the liver carried out by a resident medical officer.

The symptoms were in short fever, enlarged liver with pain and tenderness, coated tongue, cough and sometimes rhonchi, and wasting. There were no ova in the stool. Two days after the needling an ascaris was passed and after santonin 3 more adults. Their sex is not stated. The suggestion is made that the needle hit the worms, whereupon they actively left the bile ducts.

C. L.

INHOLDER (Heinr. E.). **Drei Askariden-Fälle.**—*Schweiz. Med. Woch.* 1935. June 29. Vol. 65. No. 26. pp. 600-602.

SASAKI (Tomio). **A Case of Carbon-Tetrachloride Poisoning.**—*Jl. Public Health Assoc. Japan.* 1935. May. Vol. 11. No. 5. pp. 1-3.

Another case of death from carbon tetrachloride, given in herd fashion by the "village authorities," ascaris being present but unknown.

A woman of 41 had 2 cc. of the drug fasting, and 3 hours later 80 cc. of 20 per cent. magnesium sulphate. At 4 p.m. vomiting, and diarrhoea came on. Her death took place a week later, vomiting with and without ascarids in it being frequent; the last act being collapse with coffee-ground vomit in which were more of these round worms.

C. L.

HOEPLI (R.). **Action of *Ascaris lumbricoides* Substance on the Growth of Fibroblasts in Vitro.**—*Acta. Path. et Microb. Scandinavica.* 1935. Vol. 12. No. 3. pp. 281-289. With 3 figs.

As the result of carefully controlled experiments Hoepli reaches these conclusions:—

"Extracts of fresh *Ascaris lumbricoides* muscle and of female sexual organs prepared with Tyrode's solution, furthermore *Ascaris* body fluid and salt solution in which worms had lived for four days influenced unfavorably, in varying degree, chicken fibroblasts (chondroblasts) in vitro. Since the pH of the various liquids used for the experiments was within the range suitable for fibroblast cultures, it could therefore not be responsible for the unfavorable action. The possibility that perhaps highly diluted *Ascaris* body fluid might stimulate the growth of fibroblasts was excluded by a series of experiments.

"The results obtained with *Ascaris* may serve as a basis and control for experiments with other helminths which are known to cause more severe lesions of the surrounding tissue. If substance of such worms will show an unfavorable action on cells in vitro, the results obtained with *Ascaris* should be considered before one regards such an action as specific."

C. L.

MAPLESTONE (P. A.). **The Rate of Development of Hookworm Eggs.**—*Indian Med. Gaz.* 1935. July. Vol. 70. No. 7. pp. 368–370. With 1 fig.

A note to impress on students that there is quick development of eggs in the stool in the tropics, the text-book 4-celled egg being uncommon.

Eggs isolated by D.C.F. in salt or sugar solution were washed and put on one side in April and May. The shortest times for hatching noted were 5 and 10 hours. The rate was much different from day to day in stools from the same person. It seemed quicker in eggs thus isolated than in those left in the stool, and to be no different when floatation was in salt or sugar.

C. L.

STÉVENEL (L.) & BERNY (P.). Action de la cyanamide de chaux en solution à 3/1000e sur les ankylostomes. [**Action of Calcium Cyanamide on Hookworm Eggs and Larvae.**]—*Bull. Soc. Path. Exot.* 1935. Oct. 9. Vol. 28. No. 8. pp. 714–715.

This solution, cyanide of calcium 1 in 3,000, prevented hookworm eggs from developing into embryos or destroyed within 3 days all larvae which had been allowed to develop.

C. L.

CHANDLER (Asa C.). **A Review of Recent Work on Rate of Acquisition and Loss of Hookworms.**—*Amer. Jl. Trop. Med.* 1935. May. Vol. 15. No. 3. pp. 357–370. With 3 charts. [13 refs.]

"This critical review of the available data on seasonal fluctuations in level of hookworm infection when reinfection is discontinuous or ceases seems to me to indicate that there actually is a very decided fluctuation.

"This implies that a climate which affords a favorable and an unfavorable season for acquisition of hookworms leads to a considerable annual exchange of old worms for new. The data suggest, however, that in communities where an equilibrium has been reached there is no marked increase in egg output until about six months after reinfection has occurred. In the past it has commonly been assumed that the effect of reinfection would be reflected in egg output in from six to eight weeks, which is the time required for oviposition to begin. As soon as the egg production of the new worms has reached a high point, however, it falls off again very rapidly, presumably due to the hosts' resistance beginning to operate on the six-months-old worms, causing their expulsion at a rapid rate. If this theory is correct it would be expected (1) that sanitary reforms would be followed by a rapid lowering of the level of infection after about six months or earlier if the reforms were preceded by a season unfavorable for hookworm infection; (2) that in the absence of sanitary improvement, reinfection would occur fairly rapidly after treatment unless the whole community were treated; and (3) that mass treatments given in a season when the ground is practically free from hookworm larvae would be of much greater benefit than one given when larvae are abundant in the soil."

C. L.

YAMASAKI (Mikio). Clinical and Experimental Studies on Hookworm Infection.—*Japanese Jl. Experim. Med.* 1935. Aug. 10. Vol. 13. No. 4. pp. 457–470. With 17 figs. on 3 plates.

An attempt to find out whether there is a connexion between oral hookworm infection and "young greens disease."

"Young greens disease," Wakanabyo in Japanese, is seen as an endemic in certain areas of the Tottori prefecture in late summer having as symptoms restlessness, nausea and sometimes vomiting; 3 or 4 days later they are lost and coughing comes on and may not be got rid of for months; in many of these sufferers hookworm eggs are seen in the faeces in large numbers about six weeks after the onset of symptoms. By a floatation method, seemingly an indirect centrifugal one, the percentages of hookworm infection in adults and children were—among farmers 62 and 12, and among town dwellers 15 and 7; the similar figures for ascaris were 65 and 55, and again 22 and 16. The rise of hookworm infection with age in farmers is put down to cutaneous infection through work on the land, a possible dejectional infection not being mentioned, while for ascaris this rise is absent "because the infection mode of this parasite is only in the oral way." After the giving of certain experimental results with heat and salt and of histological findings in optimum and non-optimum hosts fed on infective larvae, there is a consideration of "young greens disease" thought to be "caused by the taking of young greens, especially those of the radish variety, which have been preserved overnight in a salted mixture." Hookworm larvae were seen on radish leaves, and it is said that no one before Yamasaki had noticed respiratory symptoms in oral infections. It is noteworthy that some of the illustrations show larvae in mouth tissues, the portal system having been in this way bypassed. C. L.

JACOBS (W. P.), KENDRICK (J. F.) & SWEET (W. C.). Hookworm Incidence and Intensity in South India by Districts.—*Indian Jl. Med. Res.* 1935. Oct. Vol. 23. No. 2. pp. 441–446. With 2 maps.

The survey by Willis's technique, alone or combined with that of Stoll, was made between 1920 and 1931. Its results are set out with maps after conversion to "basis formed stools."

Of 15,178 hookworms 7.9 per cent. were *A. duodenale*. There was a fairly low hookworm load with a fairly high incidence. C. L.

KHALIL Bey (M.) & SALAH (M.). Some Clinical Manifestations of Ancylostomiasis.—*Jl. Egyptian Med. Assoc.* 1935. June. Vol. 18. No. 6. pp. 378–388. With 2 charts.

Ankylostomiasis is the cause of symptoms from which a diagnosis of some organic disease may be made, with danger to life.

A yellow skin with no suggestion of green, no colouring of the sclera, no bile or urobilinogen in the urine and a normal icterus index. Anaemia with fever and heart murmurs, the fever going away and anaemia becoming less under large doses of iron. Symptoms like those of duodenal ulcer but with the duodenal cap present on X-ray examination, these and occult blood no longer present after deworming. Symptoms as of gastric cancer or of enterocolitis. Those of nephrosis. Then there is mention of two acute cases with the usual syndrome and the making again of the point that the amount of anaemia is not parallel to the number of worms. C. L.

ZAU (F. D.). Meningism of Helminthic Origin. A Survey of 43 Cases apparently due to Infection with Helminthiasis and 2 Cases apparently due to Infection with Relapsing Fever.—*Chinese Med. Jl.* 1935. July. Vol. 49. No. 7. pp. 689–693. With 2 figs.

The presence of intestinal parasites, chiefly hookworm and ascaris, may be the cause of a meningitic condition, the proof being that with deworming the symptoms come to an end.

The cases are really of 2 sorts—a meningism with no organisms in the spinal fluid though this was slightly turbid, and a meningitis with micro-organisms and a cloudy fluid. With deworming there was recovery of all cases of the first condition and of 33·78 per cent. of 74 cases of the second; so that this aim is of great importance in any case. Treatment was by 30 minims of oil of chenopodium. Two cases of meningism caused by *Sp. recurrentis* are cited. C. L.

POGGI (Igino). Sull' infestione da "*Anchylostoma duodenale*" nel comune di Vigevano. (Nota preventiva.)—*Arch. Ital. Sci. Med. Colon.* 1935. July 1. Vol. 16. No. 7. pp. 516–525. With 1 fig. English summary (3 lines).

BONNE (C.). Over een worminfectie van de submucosa van den dunnen darm. [**Helminthic Infestation of the Submucosa of the Small Intestine.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1935. May 28. Vol. 75. No. 11. pp. 893–904. With 8 figs. English summary.

In 3 of about 3,000 necropsies on Malayan men and women in Batavia, Bonne has seen nematodes on the submucosa, among haemorrhages.

Case I.—Many eggs and larvae of hookworm type and size.

Case II.—A worm 0·3 mm. across with buccal capsule and strong chitinous hooks, and biting fiercely into the circular muscle. Only 3 sections available. Apparently an immature female or a male, there being no eggs or larvae.

Case III.—Well developed buccal capsule with teeth and too much blood in it to clear properly. Worm about 0·6 mm. across. Eggs and larvae in submucosa. The man died of purulent peritonitis from "a perforation in the wall of a very much narrowed part of the jejunum, 60 cm. below the pylorus." *Ancylostoma duodenale* is not so common in Batavia as is *N. americanus*. C. L.

VAN SLYPE (W.). Recherches pathogéniques et thérapeutiques sur l'ankylostomiase. [**Ankylostomiasis. Pathological and Therapeutic Studies.**]—*Ann. Soc. Belge de Méd. Trop.* 1935. Sept. 30. Vol. 15. No. 3. pp. 421–467. With 4 figs. [38 refs.]

A detailed study of 48 cases of "ankylostomiasis" with special reference to blood loss, material used, quantitative diagnosis, red cell and haemoglobin values, lysins, corpuscular resistance, urobilinuria, bilirubinaemia, pathology, and slight infections.

In these cases care was taken to exclude, as far as possible, syphilis, alcoholism and malaria. A discussion on blood loss *versus* toxins brings the conclusion that there is blood loss, and that the nature of a possible toxin is as yet unknown. The material used was made up of 48 indigenous males between 18 and 40 years of age and mostly young. Under the heading ankylostomes are included *Ancylostoma*,

Necator, Ternidens and Trichostrongylus, which locally have been found present in percentages of 74, 63, 19 and 10. Quantitative diagnosis was by Stoll's method using 0.01 gm. of faeces, it being noted that D.C.F. is more accurate but demands a more complicated apparatus. Anaemia was [as usual] more or less proportional to faecal egg numbers (a female being represented by 12 to 44 eggs to the gram); but with frequent and noteworthy exceptions, for the first and last items in the table show 200, 3, 87.5 and 800, 6, 90 for number of eggs, millions of red cells, and percentage of haemoglobin respectively. Reticulocytes [hématies granuleuses] were present in 18, mostly in those with anaemia. As to lysins the pyramidon reaction [this *Bulletin*, 1933, Vol. 30, p. 670] is very variable, present in 50 to 60 per cent. of those with "ankylostomes." Isolysins were absent in 26, present in 1 when the man's serum was used with red cells from a normal control, and in 6 when the man's serum was used with red cells from another man with this infection. Heterolysins were present in all of 15 cases examined and in the one normal control used. Of 27 cases the red cell resistance was normal or nearly so in 12, lessened in 3 and increased in 12. Urobilinuria was present in 20 of 28 men and had no relationship to the number of eggs passed, bilirubinaemia often increased, judged by van den Bergh's indirect reaction. Jaundice appeared 6 times in 48 after the giving of carbon tetrachloride, particularly in those with slight infections as judged by worm counts. Light infections are held to be of importance for two reasons. First, there are men with these numbers of eggs per gram, red cells (in millions) and haemoglobin 200, 3, 87.5; 400, 2.94, 81; 400, 2.4, 82.5. Second, van Slype has been greatly impressed by the number of apparently healthy persons who come to him begging for the medicine to make them strong, meaning carbon tetrachloride, and they do this in spite of such deterrents as its taste and the febrile jaundice which is apt to follow it. He ends emphatically by urging that the discovery of eggs in the stool necessitates treatment, whatever their numbers. C. L.

LAVERGNE (J.). Le traitement de l'ankylostomiase par la méthode italienne au chloroforme-huile de ricin. [**The Chloroform-Castor Oil Treatment of Ankylostomiasis.**—*Bull. Soc. Path. Exot.* 1935. June 12. Vol. 28. No. 6. pp. 441-443.]

Chloroform-castor oil is the treatment of election for hookworms.

This sweeping recommendation of an old remedy is based on 37 cases compared with oil of chenopodium in 18, there being no note of its ascaridole content, with thymol in 9 there being no mention of particulation, and of santonin in two. It was the only treatment after which worms were recovered in the stools and gave the lowest percentage of egg-containing specimens when faeces were examined by an unstated method 20 days later. Finally the author asks whether there is digestion of dead worms, a question answered in the affirmative many years ago. C. L.

DE FREITAS (Octavio). Frialdade e anemia tropical. [**Frialdade and Tropical Anaemia.**—*Arch. Brasileiros de Med.* 1935. Sept. Vol. 25. No. 9. pp. 349-360.]

"Frialdade" is a local popular name designating a disease brought over from Africa with the natives and characterized by a more or less

pronounced anaemia, in fact ankylostomiasis. The word itself primarily meant chilliness and so figuratively, coldness, dullness, apathy. It has several other synonyms *opilação* (constipation, torpor), *cauçaço* (lassitude), *inchaço* (swelling, presumably oedema), *amarellão* (yellow, probably the pallid tint of severe anaemia), *cachexia africana* and others—well recognized symptoms of severe hookworm infestation. This article is a Congress paper dealing with the subject mainly from the historical aspect. H. H. S.

TONKING (H. D.). **Ancylostomiasis in Digo District.**—*East African Med. Jl.* 1935. Aug. Vol. 12. No. 5. pp. 149–151.

In Msambwene, a selected healthy village, there was a hookworm infection rate of 100. With the advised precautions, the eggs in 1 cc. of faeces were counted by D.C.F. [not D.C.F.F.]. The number varied from 2 to 3,800 with an average of 466 [and must have been many more], the mean haemoglobin to the Talquist scale was 60 in over 1,000 cases, and the eosinophils in 50 unselected cases 13·46. *Ascaris* was present in 29, *trichuris* in 37. [Presumably the salt solution used was a saturated one with a specific gravity of about 1,200.]

C. L.

PLUM (Denis). **Observations on Ankylostomiasis and Anaemia in Kenya, with Special Reference to the Digo and Embu Districts.**—*East African Med. Jl.* 1935. Sept. Vol. 12. No. 6. pp. 162–185. With 2 graphs. [35 refs.]

In the Msambweni Hospital, routine examinations of inhabitants of Digo District gave the following *percentages* of infection: malaria 35 of 1,690, urinary schistosomiasis 51 of 421, "ancylostomiasis" 69 of 444, the percentages in males and females being near to one another. Of the 444 faecal tests the *numbers* of persons with other infections were *ascaris* 308, *taenia* 13, *trichuris* 180, *strongyloides* 26, *S. mansoni* 13, *E. histolytica* 13, the quantity in use being "a platinum loopful of faeces, diluted when necessary with water."

The *percentage* of infection of Embu and Digo Districts, the former measured by 1,946 smears at Keruguya hospital, are very different, being respectively: hookworms 6 and 68 [or 69], *ascaris* 79 and 17, tapeworms 34 and 2·7, urinary schistosomiasis negligible and 50, malaria 47 and 27. The species of plasmodium in the two villages were present in nearly the same relative percentages. Tables give the effect of various treatments on eggs in the faeces and on the anaemia. [As to these, the reviewer is unable to bring himself to believe that the dosage used for carbon tetrachloride was really 40 cc. in most cases and for ascaridole up to 40 cc., so makes no reference to cure rates and regrets the use of the term ancylostomes to cover, it seems, all ankylostomes of whatever genus.] Plum's conclusions are these:—

" 1. The anaemia of the Wadigo is an iron-deficiency anaemia effected chiefly by ancylostome infection of a people whose diet is deficient in iron.

" 2. The cure of the mass anaemia in Digo is dependent upon a radical alteration in the dietary in addition to anthelmintic treatment and satisfactory disposal of faeces."

C. L.

RODRIGUEZ MOLINA (R.). Treatment of the Anemia associated with Hookworm Disease. Preliminary Report.—Puerto Rico J. Public Health & Trop. Med. 1935. Sept. Vol. 11. No. 1. pp. 49-55. [10 refs.] [Spanish version pp. 56-62.]

A report on 5 cases showing the relative importance of iron and of deworming for the cure of anaemia in heavy hookworm infections.

This paper was read at the meeting of the Pan American Medical Association held at San Juan, Porto Rico, in March 1934. The 5 cases all passed more than 1,000 hookworms after an anthelmintic, but before this they were in hospital for 40 days during which time blood examinations were regularly made. On admission there was a microcytic hypochronic anaemia with red cells from 1.5 to 3.5 millions and haemoglobin from 4.2 to 5.3 grams (29 to 36.4 per cent.) by the Newcomer-Klett instrument which takes 14.5 grams as 100 per cent. Daily two of them received 6 gm. of iron and ammonium citrate, one 3 gm. of this, as well as a liver extract representing 350 gm. of fresh liver, one 2 gm. of the iron salt and 6 gm. of a commercial gastrohepatic concentrate, and the 5th a full hospital diet only. While in hospital all gained weight, all had a steady rise in blood values, but only to a subnormal level, that is the red cells rose to between 3.5 and 4.3 millions and the haemoglobin to between 10.6 gm. (72.9 per cent.) and 12.2 gm. (83.4 per cent.) the highest value being in one of those taking iron and ammonium citrate 6 gm., and the lowest in the man on hospital diet. The anthelmintic was 2.5 cc. of carbon tetrachloride. Within a week of taking it the red cells had risen to between 5 and 6 millions in all, in the 2 cases taking 6 gm. of iron the haemoglobin rose to 15.3 and 16.3 gm. respectively (106 and 112 per cent.), in the others it remained about 11.4 gm. (78.4 per cent.). The two cases with full iron dosage were passing eggs 3 weeks later, so that neither of them was really dewormed; one lost blood values rapidly, the other showed further improvement in spite of this.

C. L.

TIMPANO (P.). Valore prognostico della v.di s.dei globuli rossi e dell'eosinofilia negli anchilostomiasici. [Prognostic Value of Red Corpuscle Sedimentation and of Eosinophilia in Ankylostomiasis.]—Ann. d'Igiene. 1935. Apr. Vol. 45. No. 4. pp. 263-266.

The author recorded last year the results of his investigations into the sedimentation rate of red cells in hookworm disease (see this *Bulletin*, 1935, Vol. 32, p. 267) and he now follows this by a study of the value of this test and of the degree of eosinophilia in prognosis. His findings are based on 27 patients with ankylostome infestation and 7 free but belonging to families in which there have been cases recently. An acceleration of the sedimentation rate was demonstrated so long as the infestation continued, but on removal of the cause, *i.e.*, getting rid of the hookworms, the rate again became normal. The rate increase was not proportional to the number of worms but rather to the changes set up by them, since in certain individuals a few worms may cause profound alterations in the blood while in others a heavier infestation may cause little detriment and the sedimentation rate is affected only when the infestation definitely affects the blood.

The return to normal occurs in 2-3 weeks after removal of the worms. If the rate becomes normal and worms are still in the intestine, these are presumably male. As regards eosinophilia the author makes

no fresh addition to our knowledge that the degree of eosinophilia is unrelated to the amount of infestation. [The presence or absence of hookworms was determined by "examination of the faeces," but the technique of this examination is not stated in the paper.]

H. H. S.

MAPLESTONE (P. A.) & MUKERJI (A. K.). **The Passage of Hookworms after Treatment.**—*Indian Med. Gaz.* 1935. June. Vol. 70. No. 6. pp. 320-321.

The discovery of no worm in the first stool after the taking of an efficient anthelmintic has been held to be a rough test of the need there had been for the giving of anthelmintics on a mass scale. Such a test gave in the authors' hands no demonstration that a man had been worm-free and no idea of worm numbers if he had not.

The anthelmintic in use was tetrachlorethylene 3 cc. and oil of chenopodium 1 cc. in magnesium sulphate [see this *Bulletin*, 1934, Vol. 31, p. 393]; there is no note of the strength of ascaridole in the oil. The account is of 100 infected persons. The test of cure was that no eggs were seen by D.C.F. 10 days after treatment; by this, cure took place in 73. Numbering of eggs was done on all these persons before treatment and "showed absolutely no correlation with the number of worms subsequently passed." Discovery of worms was by sieving. Of the hundred cases, no worms were seen in the first stool in 42, but 5 of these went to stool within 15 minutes of taking the anthelmintic. In 55, fewer than 20 worms in all were seen, and their discovery took place in the first stool in 28 of them; in 45, with 20 or more worms the number was 30. Details are given of all these more weighty infections. The relation between the worms seen in the first stool on the one hand and in all of them up to 3 or even 4 days on the other was at the smallest 0-360, and at the greatest 80 in 84, 234 in 252, 219 in 233, and 182 in 199. The largest figures were 748 in 1,249 but in no case may they be taken as a suggestion of the numbers of all worms harboured.

C. L.

KIRBY-SMITH (J. Lee). **The Treatment of Creeping Eruption.**—*Southern Med. J.* 1935. Nov. Vol. 28. No. 11. pp. 999-1004. With 16 figs. [23 refs.]

The treatment most useful in destroying the larva of *A. braziliense* in a creeping eruption is ethyl chloride freezing.

Kirby-Smith has seen 5,000 cases of creeping eruption. For prevention, in areas where the infection is common, children should not go barefoot on wet soil nor should anyone sit on this. When the lesions are simple and without septic complications the area for 1½ in. round the visible end of the burrow should be frozen for 2 to 4 minutes with ethyl chloride. A pencil of carbon dioxide snow is very painful and the vesicle heals slowly. With multiple lesions the ethyl chloride freezing should be applied only to a few at a time. If there is secondary dermatitis this must first be got rid of, for otherwise the ends of the burrows cannot certainly be seen. There is an illustration of an ethyl chloride tube whose spray is under easy control. For discussion SHELMIER had a preference for freezing for 30 seconds only at a time to avoid superficial necrosis, but Kirby-Smith did not think this was long enough for destruction of these larvae in the epidermis. [Kirby-Smith has written "To the present day it has not been demonstrated

that man harbors this parasite." In 1913 the reviewer was the first to report the presence of the adult parasite in 3 of 30 prisoners coming to his jail from that of Mymensing, Bengal [see this *Bulletin*, 1913, Vol. 2, p. 188], and in the same year noted that it was seen in the faeces of 9.3 per cent. of 150 treated prisoners at Barhampore, Bengal [see this *Bulletin*, 1914, Vol. 3, p. 293]. AFRICA [see this *Bulletin*, 1932, Vol. 29, p. 862] has collected many instances of this infection in man, and SHELMIRE in the discussion reported the probable occurrence of another case.]
C. L.

MALDONADO SAMPEDRO (M.). La lucha contra la anquilostomiasis en la Sociedad de Peñarroya (1928-1932). [**Hookworm Campaign in the Peñarroya Company's Mines.**—*Medicina Paisés Cálidos* Madrid. 1935. Aug. Vol. 8. No. 8. pp. 361-384. With 11 figs.

These mines are situated in Spain, in the Province of Córdoba, Cuidad Real and Jaén. Among 1,762 men employed in 17 mines, 893 or 50.6 per cent. were infested with hookworm. In this article records in more detail are given for two mines in Córdoba, viz. El Antolín and San Rafael. At the former in an examination made in 1925 of 378 persons examined 234 or 61.8 per cent. and at the latter 243 among 311 or 78.1 per cent. were positive. In another table dealing with more recent figures of 995 examined at El Antolín 420 or 42.2 per cent. were positive, the greatest degree of infestation being 53.7 among 196 between 25 and 34 years of age, those between 25 and 29 having almost the same, 53.8, as those of 30 to 34 years of age, 53.6 per cent. At San Rafael of 456 examined 257 or 56.3 per cent. were positive, among those aged 20-24 years 46 were positive out of 56 (i.e. 82.1 per cent.), the next being between 30 and 34 years among 71 of whom 42 or 58.8 per cent. were positive.

As regards other helminth infestations, at El Antolín among the same number (995) 52 harboured *Trichuris* (5.2 per cent.) and 23 or 2.3 per cent. *Hymenolepis nana*, 11 or 1.1 had *Enterobius*. At St. Rafael 42 or 9.2 per cent. harboured *Trichuris*, 16 or 3.5 *H. nana* and 7 or 1.5 per cent. *Enterobius*. [In none of these is the method of examination stated; it was probably by direct smear.]

For treatment, at first chloroform and castor oil were given, later oil of chenopodium, and carbon tetrachloride were the chief drugs used, and of a total of 1,218 miners treated 1,182 were cured, a 97 per cent. success. Oil of chenopodium proved the most satisfactory; it was given before any food in the morning in a single dose of 1.8 gm. in gelatine capsules, and was followed 45 minutes later by 30 gm. of sulphate of magnesium. The patients were advised to take no food during the forenoon and to abstain from alcohol in any form during that day.
H. H. S.

ARAR (Asim). Les résultats de la lutte contre l'anquilostomiase dans la province de Rizé (actuellement Tchouk) en Turquie. [**The Hookworm Campaign in Rizé Province, Turkey.**—*Bull. Office Internat. d'Hyg. Publique*. 1935. Sept. Vol. 27. No. 9. pp. 1774-1778.

This campaign against the hookworm has now covered 138,468 sick.

This paper is a continuation of that already noted [this *Bulletin*, 1932, Vol. 29, p. 420].

The gross clinical signs of ankylostomiasis were anaemia with red cells down to 700,000 and haemoglobin to 10 and an eosinophilia up to 35. The incidence to Stoll's technique is from 20 to 67 per cent. [so must in fact be considerably higher]. Carbon tetrachloride is a better anthelmintic than chenopodium, tetrachlorethylene, or hexyl-resorcinol. Its adult dose was 2 cc. and it has apparently been given without fatality [at least none is mentioned] and signs of intolerance were, as if by magic, no longer to be seen after sulphate of soda (Na_2SO_4) was given in place of sulphate of magnesia (MgSO_4). Second and third treatments were given when faecal testing showed that eggs were still present, and the percentage of infection [determined as above] has fallen from 50 to 8 after 3 treatments. Sanitation seems limited to leaving faeces in pits, for decomposition to do its work. The parasite is named as *Necator americanus*. C. L.

FOSTER (A. O.). **The Immunity of Dogs to *Ancylostoma caninum*.**—*Amer. Jl. Hyg.* 1935. July. Vol. 22. No. 1. pp. 65–105. With 7 graphs. [11 refs.]

A dog's general condition is an important point in the prevention of hookworm infection. If this is good its resistance to infection is greater.

An earlier infection had no certain effect in the prevention of a test one, since in 2 experiments resistance was greater and in 3 was less. To free a dog of infection before giving it a test infection did not have an effect on the test infection. In other experiments light hookworm loads seemed to lead to a better resistance; but 12 died of acute hookworm disease after repeated infection, so that the belief is that with a heavy infection there may be predisposition to further infection. Age resistance was poor in an ill-nourished litter.

C. L.

FOSTER (A. O.). **Further Observations on Prenatal Hookworm Infection of Dogs.**—*Jl. Parasitology.* 1935. Aug. Vol. 21. No. 4. pp. 302–308. [27 refs.]

"The administration *per os* of single doses of infective larvae of *A. caninum* to three pregnant bitches at intervals of 5, 9, and 32 days, respectively, before parturition (gestation normally 63 days) resulted in prenatal hookworm infestations in all but one of twenty-one puppies. Although the mothers were very resistant to hookworms, the puppies did not appear to be protected on this account. One litter of five pups was prenatally infected with the "cat strain" of *A. caninum* as a result of administering larvae to the mother only two days before birth of the puppies. It is suggested that the occurrence of prenatal infection with parasite worms may be of economic and public health importance."

C. L.

FAUST (Ernest Carroll). **Experimental Studies on Human and Primate Species of Strongyloides. IV. The Pathology of Strongyloides Infection.**—*Arch. Pathology.* 1935. June. Vol. 19. No. 6. pp. 769–806. With 16 figs. [26 refs.]

For the last study see this *Bulletin*, 1935, Vol. 32, p. 235. The scope of this one is shown in its title.

On account of the different views in the literature, 62 dogs were given infection with a strain of strongyloides from man and kept

under controlled conditions till they were killed or died. The skin lesions were unimportant. There was damage to the lungs in 29 per cent.—haemorrhage, alveolar ruptures, exudation of leucocytes into the air passages. This last is held to be bad for the host, because it imprisons larvae so that there is growth of them in the bronchi to full development with invasion of the palisade epithelium and birth there of young. But when there has been carriage of larvae to the digestive canal they form similar tunnels through the crypts into the stroma of the mucosa, mostly in the duodenum and jejunum but in addition in the stomach and even the rectum. In these tunnels there is oviposition and hatching, and the larvae make their escape into the lumen of the intestine. "Thus both mechanical and lytic damage is produced, at times effecting a honeycombing of the depths of the mucosa frequently associated with hyperplastic tips or even extensive sloughing of the entire area evolved." The tissue reaction to the worms is encapsulation with phagocytosis by epithelioid cells. "Larvae attempting to invade the muscularis mucosae are immediately surrounded by an infiltration of cells resembling a pseudotubercle. Extensively damaged tissue in any zone is subject to fibroblastic repair. In all of these local actions eosinophils are conspicuously absent."

C. L.

BEACH (Ted de Vinne). **Experimental Propagation of Strongyloides in Culture.**—*Proc. Soc. Experim. Biol. & Med.* 1935. June. Vol. 32. No. 9. pp. 1484–1486.

"So far as is known this is the first demonstration of continued propagation" of the free-living phase of any species of *Strongyloides*.

The form was *S. simiae* of New World monkeys; the culture medium was filtered nutrient agar 2 gm. extract in water of monkey faeces 25 cc., distilled water 25 cc. The belief is that males of the third generation were present.

C. L.

VALCKE (G.). **Traitement de l'anguillulose par une cure combinée d'émétique et de violet de gentiane.** [**Treatment of Strongyloides Infestation by Tartar Emetic and Gentian Violet.**].—*Ann. Soc. Belge de Méd. Trop.* 1935. Sept. 30. Vol. 15. No. 3. pp. 387–390.

With treatment and while under observation the stools became negative and the health good in 3 cases, in the fourth there were no such results. In the last, treatment was gentian violet 0.06 gm. three times a day for a week, in the others 0.1 gm. with tartar emetic. Eosinophilia was marked.

C. L.

CHANDLER (Asa C.). **Studies on the Nature of Immunity to Intestinal Helminths. I. The Local Nature of the Immunity of White Rats to Nippostrongylus Infection. II. A Study of the Correlation between Degree of Resistance of White Rats to Nippostrongylus and Interval between Infections.**—*Amer. Jl. Hyg.* 1935. July. Vol. 22. No. 1. pp. 157–168; pp. 243–256. With 1 graph.

So far as they seem to apply to man the conclusions may be put as these—no active immunity against these parasites is got by injection of serum of parasitized rats and that in "parabiotic twins" any

active immunity of one, got by injections of worms, is not present in its "twin" though there was good intermingling of blood. So the belief is that immunity is local in the mucosa, perhaps nutritional and possibly anti-enzyme in nature and may be a very widespread phenomenon. The tardy arrival of larvae in the intestines after 3 or 4 infections is not due to intestinal immunity but perhaps to some reaction of cells in the lungs and air tubes. C. L.

HEADLEE (William Hugh). **Studies on Infections of Human Parasitic Worms under Institutional Conditions.**—*Jl. Lab. & Clin. Med.* 1935. July. Vol. 20. No. 10. pp. 1069-1077. [11 refs.]

Using the smear, Willis's floatation method, and perianal scraping, only one kind of infection, *Enterobius vermicularis*, was found in 876 examinations on 652 patients in a mental hospital in Illinois.

In 89 examinations by faecal smear no eggs were found, in 505 by Willis's technique 3·37 were positive, in 282 by perianal scraping 21·99 per cent. were positive. Under the heading "Institutional Environment and Helminthic Infections" Headlee points out the cleanliness of the whole premises and surroundings and the fact that there is no previous examination on which to go in making up one's mind on the question of the way of carriage of this infection in the Institution, and in doing so makes this statement "Lane (1913) in reporting on the infections in prisons and jails of Bengal, regards the possibility of infection in a jail as nonexistent." [The title of Lane's paper is "Ankylostomes and Ankylostomiasis in Bengal," and the title is the measure of its scope.] C. L.

LENTZE (Friedrich-August). *Zur Biologie des Oxyuris vermicularis.* [The Biology of *Enterobius vermicularis*.]—*Zent. f. Bakt.* I. Abt. Orig. 1935. Vol. 135. No. 1/3. Beiheft pp. 156-159. With 1 fig.

More consideration should be given to the air as a means of the carriage of *Enterobius* infection or reinfection.

Carriage of this infection has taken place where the greatest care has been used in the washing of hands and in the arrangement of night clothes so that eggs cannot be carried from anus to mouth by the hands. Again for development the threadworm egg must come in contact with acid at one stage in its development. Yet this infection has persisted when all care has been taken for the prevention of hand-to-mouth carriage of eggs, so that the suggestion has been made that contrary to the instinct which takes the females down to the rectum and out of the anus to oviposit, another one or reversed peristalsis takes them up to parts of the small intestine where the reaction is acid, and that there they make a stay of at least 6 hours—an unlikely thing to happen. Accordingly Lentze made tests of the possibility of carriage by air. A cardboard cylinder 80 cm. long and 20 cm. wide (about 31 and 8 inches) had, while kept vertical, placed in its upper part folds of a torn nightgown on which eggs of this worm had been placed and two folds of which had been rubbed together. This cylinder he shook with the enclosed cloth at about the level of his head, set it down on a glass plate, took away the cloth and covered the top of the cylinder with a piece of cardboard. The tests were of two sorts. He replaced the glass under the cylinder with a new

one, 30 seconds, 1, 2 and 5 minutes after the cloth had been taken out, and he washed out his nose. The eggs were first found on the glass at the bottom 2 minutes after the infected cloth was removed, that is to say their passage through 70 to 80 cm. of air took 2 minutes. In the washings from his nose 2 eggs were seen. He had shown already that these eggs pass through the meshes of material unless this is closely woven. His belief then is that movements of an infected person in his night clothes or bed clothes carry threadworm eggs in eddies of air to a position where they are inhaled and that they reach the stomach by active wandering or by being swallowed. His view is that the usual anal ointments soothe itching mechanically but make it easy for the females to get to the outside through the anus.

C. L.

PENSO (Giuseppe). Il ciclo di sviluppo degli Ossiuri. Sua importanza in medicina pratica. [**The Development of Enterobius; its Importance in guiding Treatment.**—*Policlinico*. Sez. Prat. 1935. Oct. 7. Vol. 42. No. 40. pp. 1943-1946, 1949. With 1 fig.]

The hypothesis is put forward that present ideas on the development of *Enterobius* are wrong, that the fertile female makes her way into the intestinal wall and there oviposits, larvae hatch and make a passage into the lumen where there is growth to the adult stage. In this way is explained the absence of eggs from the faeces, while as to larvae there is some hiding place for them. Treatment based on this hypothesis is detailed. [It is a fact that passage of pregnant female oxyurids *per anum* (that is from the lumen of the intestine) is a commonplace and that in favourable conditions they may there be seen ovipositing on a microscope slide.]

C. L.

NOLF (L. O.) & EDNEY (J. M.). **Minimum Time required by *Trichinella spiralis* to produce Infective Larvae.**—*Jl. Parasitology*. 1935. Aug. Vol. 21. No. 4. pp. 313-314.

In a series of rats fed by stomach tube with 5,000 trichinae, encysted larvae were first seen in the diaphragm on the 17th day and were at that time infective to other rats.

C. L.

GOLDWATER (Leonard J.), STEINBERG (Israel), MOST (Harry) & CONNERY (Joseph E.). **Haemoptysis in Trichiniasis.**—*New England Jl. of Med.* 1935. Oct. 31. Vol. 213. No. 18. pp. 849-851. [Summary appears also in *Bulletin of Hygiene*.]

Pulmonary signs or symptoms occur in half the cases of trichiniasis, but that haemoptysis also occurs, though it has been reported and indeed produced experimentally, is not generally known, and the fact is not mentioned in text-books of medicine nor does trichiniasis as a rule enter into discussion of the causes of haemoptysis or in the diagnosis of pulmonary tuberculosis. Hence the recording of these three cases is amply justified. The symptoms and history were typical in all and the presence of trichinella was proved by biopsy in one, and high eosinophilia in all, over 30 per cent. In each case the haemoptysis was a fairly late symptom, 23 days after ingestion of the incriminated pork and about 21 after the initial symptoms.

Trichinella was not found in the expectoration which was examined in two cases. ASKANAZY in his experimental work found them embolized in the lungs and FROTHINGHAM nearly 30 years ago reported finding them at autopsy in the haemorrhagic areas of the lungs of a patient dying with trichiniasis.

H. H. S.

SPINK (Wesley W.). **Cardiovascular Complications of Trichinosis.**—*Arch. Intern. Med.* 1935. Aug. Vol. 56. No. 2. pp. 238-249. With 4 figs. [21 refs.]

"Acute myocarditis occurring in trichinosis may be a nonspecific inflammatory reaction due to the invasion of the myocardium by larvae.

"A review of the literature shows that other cardiovascular manifestations include congestion and hemorrhage of the eyes, lungs and gastrointestinal tract; edema; thrombosis; embolism with infarction, and hypotension.

"Six of eighteen cases of trichinosis (33·3 per cent.) showed electrocardiographic changes. These changes included an initial flattening or inversion of the T wave, especially in lead II, the wave subsequently becoming upright; low amplitude of the QRS complex, and intraventricular block.

"The postmortem changes in a fatal case of trichinosis with myocarditis are presented. Another case is recorded in which trichinosis was complicated by a permanent right hemiplegia."

C. L.

THEILER (Hans), AUGUSTINE (Donald L.) & SPINK (Wesley W.). **On the Persistence of Eosinophilia, and on Immune Reactions in Human Trichinosis, Several Years after Recovery.**—*Parasitology*. 1935. July. Vol. 27. No. 3. pp. 345-354. [28 refs.]

The results of differential counts, precipitin tests and skin reactions 4 to 9 years after recovery from trichinosis.

The antigen was diluted to 1 in 10,000 in terms of dry powder, and the injection was of 0·1 cc. of this in alkaline phenolized salt solution, the control injection being by an equal quantity of the extracting fluid (Coca's solution). In the precipitin test 0·2 cc. of serum was overlaid by 0·2 cc. of 1 per cent. dilution of *Trichinella* extract. Of the skin reactions 2 were negative and 5 positive, of precipitation reactions 2 were negative (the same as were negative to skin test) 4 were positive by flocculation with no definite ring, and in 1 the serum was cloudy. In 6 in which it was tested the eosinophilia was 0, 5, 5, 2, 2, 7.

C. L.

WANTLAND (W. W.). **Effect of Irradiated Ergosterol and Calcium Lactate on Calcification of Trichina Cysts.**—*Proc. Soc. Experim. Biol. & Med.* 1934. Dec. Vol. 32. No. 3. pp. 438-444. With 6 figs.

The treatment of trichinosed rabbits with these substances is of value.

The optimum dose of irradiated ergosterol is 30 to 60 drops every other day. With it there is as much calcification after 3 months as there is normally in 9 months, and the physical state of the treated was better than that of the untreated. Yet the animals may be given too much with death from calcium rigor, the symptoms being quick pulse, great weakness and dyspnoea.

C. L.

TRAWIŃSKI (A.). Studien ueber Immunität bei Trichinose. [Immunity to *Trichinella* Infection.]—*Zent. f. Bakt.* I. Abt. Orig. 1935. June 14. Vol. 134. No. 3/4. pp. 145-149. [20 refs.]

The serum of rats which 25 to 35 days earlier have been in receipt of a heavy trichina infection is a strong preventive of infection in rabbits. C. L.

HU (Stephen M. K.). Preliminary Observations on the Longevity of Infective Larvae of *Wuchereria bancrofti* Cobbold in *Culex pipiens* var. *pallens* Coquillett.—*Chinese Med. Jl.* 1935. June. Vol. 49. No. 6. pp. 529-536.

This work carries on that of Hu and YEN [this *Bulletin*, 1935, Vol. 32, p. 646] and gives proof that living infective larvae were present in this mosquito 79 days after infection, the time at which the last of the test batch lot was put to death.

Between 10 p.m. and 11 p.m. mosquitoes had a blood meal from a man in whose blood 69 and 62 microfilariae were present in every 20 cmm. at those hours; 22 mosquitoes were put to death between day 10 and day 93. Mosquitoes with heavy infections have lived for a considerable length of time. After a blood meal there was development of infective larvae of *W. bancrofti* in *Culex pipiens pallens* and of *Dirofilaria immitis* in *Anopheles punctipennis*. Repeated infections may take place. C. L.

KARAMCHANDANI (P. V.). The Effect of Heat and Atmospheric Humidity on all Stages of *Culex fatigans*.—*Records of the Malaria Survey of India.* 1935. Mar. Vol. 5. No. 1. pp. 23-38. With 7 charts & 3 figs.

The author has determined in the laboratory what temperatures are fatal to *Culex fatigans* at all stages of its development.

No comparative study of the lethal temperature for each stage in the life-cycle of an insect has previously been made. The author finds that the lethal range is sharply defined in each case. The eggs all hatched at and below 39.8°C.; above this temperature, none hatched. For larvae exposed for one hour, the fatal range was 36°-38°C.; at 37°C., 50 per cent. died. Pupae were more resistant, with a range from 38°-40°C. In the case of adults exposed for one hour, the fatal temperature was lower in dry air than in moist: 37.4°C. at 0 per cent. relative humidity, 39°C. at 90 per cent. in the females; and about a degree lower in each case for the males. This adverse effect of dry air is attributed to desiccation; he produces some evidence that the males cannot conserve water so well as females. The results are all tested statistically. V. B. Wigglesworth.

HU (S. M. K.). Studies on the Susceptibility of Shanghai Mosquitoes to Experimental Infection with *Wuchereria bancrofti* Cobbold. I.—*Aedes albopictus* Skuse. II.—*Armigeres obturbans* Walker.—*Peking Nat. Hist. Bull.* Peiping. 1935. June. Vol. 9. Pt. 4. pp. 249-260. [18 refs.] [Summarized in *Rev. Applied Entom.* Ser. B. 1935. Sept. Vol. 23. Pt. 9. p. 213.]

"In these experiments carried out in Shanghai during 1933-34, reared adults of *Aedes albopictus*, Skuse, and *Armigeres obturbans*, Wlk., were allowed to feed once for one hour on a person heavily infected with *Filaria*

(*Wuchereria bancrofti*) and were dissected not less than 5 and usually more than 10 days later.

"The following is taken from the author's summaries: Of 62 *A. albopictus* fed, 48 contained dead immature forms in the thorax and abdomen, 4 of which had undergone chitinous encapsulation. Of 102 *A. obturbans*, 81 contained dead microfilariae in the thorax and abdomen, most of which were chitinised; 11 contained chitinised encapsulated larvae of the 'sausage' form. Filarial larvae developed to the infective stage in *Culex pipiens*, L., fed at the same time on the same case. Dissections of 383 examples of *A. obturbans* and 27 of *Aedes albopictus* collected during 1933 from houses in the Woosung area revealed no filariae, although examples of *C. pipiens* from some of the houses were infected."

FENG (Lan-Chou). **Intermediate Hosts of *Microfilaria malayi* in Chekiang, China.**—*Proc. Soc. Experim. Biol. & Med.* 1934. Dec. Vol. 32. No. 3. pp. 494–496.

The best host for larval development of *Filaria malayi* was, in these tests, *Anopheles hyrcanus sinensis*.

In *A. h. sinensis*, larvae became infective on the 6th day at temperatures of 29° to 32°C.; of 44 given infective feeds and still living on that day, 30 were harbouring infective filariae; and in 14 of them their habitat was the labium. In *M. (Mansonioides) uniformis* only a small number came to full development, most becoming granular and degenerated on the 5th day. In 3 other mosquitoes, common and blood-suckers, namely *Culex pipiens*, *Aedes albopictus* and *Armigeres obturbans*, microfilariae did not go to full larval development.

C. L.

FENG (L. C.) & YAO (K. F.). **Observations on Filariasis in Huchow, Chekiang, China.**—*Chinese Med. Jl.* 1935. Aug. Vol. 49. No. 8. pp. 797–801. With 1 map.

"1. Of 2112 patients admitted to the Huchow General Hospital in Huchow, Chekiang, from October 1932 to August 1933, 44 or 2.08 per cent. were positive for microfilariae in their blood.

"2. Of the 44 positive cases, 38 showed infection with *Microfilaria malayi*, 2 with *Microfilaria bancrofti* and 4 were mixed infections.

"3. Light infection with *Microfilaria malayi* in patients whose physical conditions were healthy and whose sleeping habits were normal, showed a definite nocturnal periodicity. In one heavily infected, tuberculous (pulmonary) case who was very much debilitated and whose sleeping habit had been irregular for 2 months, microfilariae were found all the time in the peripheral blood.

"4. The distribution of the two types of filarial infection in the Chekiang-Kiangsu border is discussed."

C. L.

SCHEEPE (F. L.). **De verspreiding der Filariasis in Indragiri (Residentie Riouw en Onderhoorigheden).** [**The Spread of Filariasis in Indragiri (Sumatra).**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1935. July 22. Vol. 75. No. 13. pp. 1197–1201. With 1 plate.

Indragiri is situated in the middle of Sumatra and possesses a total population of about 50,000, dwelling for the most part along the river. The author began his investigation in 1930 and proceeded to determine the number of filaria carriers kampong by kampong. He also used the abundant material of two estate hospitals. A total of 5,519 persons were examined from the high lands of Indragiri. Night blood

alone was examined, with the result that 990, about 18 per cent., proved to be positive carriers of the *Microfilaria malayi* described by Brug. These carriers showed manifest elephantiasis in 80 cases. An examination, however, of the night blood of 43 persons with enlarged limbs furnished only four positive microfilaria carriers. Abscesses and infiltrations were met with in 18 out of 70 microfilaria carriers who were free from elephantiasis, but the microfilaria itself was never found in the pus. The two chief mosquito species met with were *Taeniorhynchus annulipes* and *T. uniformis* of which the former was much the commoner type. Treatment is only symptomatic.

W. F. Harvey.

SNIJEDERS (E. P.). Over een geval van filariasis. [**A Case of Filariasis.**]—*Nederl. Tijdschr. v. Geneesk.* 1935. June 22. Vol. 79. No. 25. pp. 3024-3030. With 7 figs. on 1 plate.

A straightforward case of filariasis is here used in a clinical lecture to illustrate certain points of the disease. The patient, a man of 32 years of age, was in apparently good health, and due to return to his work in the Belgian Congo. He had no organic disease and no Wassermann reaction, but showed an occasional albuminuria and a 54 per cent. eosinophilia. There were no casts in the urine, no increase of blood urea and nothing to note as regards heightened blood pressure. Only the two symptoms remained, together with the locality of his work, to point to a possible cause. Examination of the faeces showed no eggs, no larvae and no proglottides. There remained to be excluded schistosomiasis. An examination of the day blood provided a definite diagnosis, for there were shown to be present *Microfilaria loa* and *Microfilaria perstans*. The method of examination was to add $\frac{1}{4}$ to 1 cc. blood to 10 cc. of a solution with the composition:—Sod. citrate 300 mgm.; saponin 100 mgm.; normal salt solution 100 cc. In this the erythrocytes are haemolyzed and the microfilariae brought down in sediment by centrifugation.

A discussion follows on the cause of albuminuria, which was obviously not dependent on a kidney lesion. The explanation offered is that this may be due to the formation of "Calabar-swellings" in the capsule of the kidney or the bladder wall.

What decision was to be made about allowing the man to return to his work? He had already spent 11 years in the Congo, was therefore experienced in the dangers of the life there. Moreover the probabilities of his being infected in this region, even had he had no infection already, were high, for this is placed at 90 per cent. It was useless attempting to cure the condition and the condition is known sometimes to cure itself with time. On these grounds then there seemed no reason to refuse the man permission to return to his work.

W. F. H.

DE AMICIS (Arturo). Un caso autoctono di filiasi da "Filaria Bancrofti" osservato in Italia. [**An Indigenous Case of Filariasis bancrofti in Italy.**]—*Giorn. Ital. di Malat. Esot. e Trop.* 1935. July 31. Vol. 8. No. 7. pp. 167-169. With 2 figs.

The author records the case of a peasant aged 27, a native of Gambabesa, Campobasso [in the Apennines, north-east of Naples], who was suffering from elephantiasis of the genitalia with lymph

scrotum, hydrocele and slight chyluria. Bodies believed to be embryos of *F. bancrofti* were found in the urine and in the blood by day as well as by night. The patient had never visited the tropics, had not even been away from his native country. H. H. S.

[The bodies in the microphoto purporting to be microfilariae in the blood correspond to these neither in details nor proportions.—C.L.]

WRIGHT (R. E.), SEETHARAMA IYER (P. V.) & PANDIT (C. G.). **Description of an Adult Filaria (Male) removed from the Anterior Chamber of the Eye of Man.**—*Indian Jl. Med. Res.* 1935. July. Vol. 23. No. 1. pp. 199–203.

"The worm . . . agrees in its morphological features with the previous descriptions of the male of *W. bancrofti* except as regards a few minor details which would not appear to be of specific importance."

The details of the case were given by WRIGHT [this *Bulletin*, 1935, Vol. 32, p. 474]. The description of the worm would have been clarified by camera lucida drawings. C. L.

KHALIL Bey (M.). **The Aetiological Rôle of Filariasis in Endemic Funiculitis and Hydrocele in Egypt.**—*Jl. Egyptian Med. Assoc.* 1935. June. Vol. 18. No. 6. pp. 389–395. [14 refs.]

A survey in Kafr Ghatati, a village 14 km. west of Cairo on the edge of the desert, with endemic filariasis.

The blood of 958 of the 1,038 persons living there was taken between 9 p.m. and midnight. *Mf. bancrofti* was present in 26.5 per cent. (28.6 in males, 24.4 per cent. females); hydrocele in 25.7 per cent. of 475 males, the percentage of microfilariae in these being 24, as against one of 30.3 per cent. in those who had no hydrocele. Thickening of the spermatic cord was present without hydrocele. C. L.

MONTISTRUC (E.) & BERTRAND (Ch.). A propos d'un cas de lymphangite tropicale. [**Tropical Lymphangitis.**]—*Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 612–614.

A large plaque of lymphangitis [? lymphatic oedema] on the antero-internal aspect of the thigh suppurated, was opened, and let out half a glass [? some 5 oz.] of pus containing streptococci. [The attention of readers of the *Bulletin* is called to this, because there is often a tendency to regard all elephantoid conditions in a filarial district as due to the helminthic infestation.—Ed.] C. L.

MENON (T. Bhaskara). **Maharaja of Travancore Curzon Lectures (University of Madras) (1934–1935). Problems in Filariasis. With a Foreword by Major-General Sir Frank Powell CONNOR, Kt., D.S.O., K.H.S., F.R.C.S., I.M.S., Surgeon-General with the Government of Madras.**—pp. ii + 67. With 22 figs. (1 coloured) on 16 plates. [107 refs.] 1935. Madras: Printed by Thompson & Co., Ltd. [Re. 1.]

In these 3 lectures the note on which Menon makes his start and his end, and to which his attention is frequently given between, is

that there are many spaces in our knowledge of Bancroftian filariasis. These he clearly points out, as well as the need for accurate and co-ordinated study before the spaces are full.

Lecture I.—Though elephantiasis arabum is such a common name the first description of the disease, and a good one, comes from India by SUSHRUTA in the Vedic and Brahminic periods of 600 B.C. After historic observations, such as MANSON'S suggestion that the infective larva escaped from the mosquito into water and was drunk, attention is given to the endemiology namely "small circumscribed foci . . . where the infection rate is very high, but neighbouring areas with very similar climatic conditions show only a lower incidence." Menon is in doubt as to the whole explanation being that physical conditions of heat and moisture of air are or are not right for the development of the larva in the mosquito and its transmission to man, and makes the suggestion that many of the facts now hard of explanation become easy if there were discovery that the infective larva can effect entry of the skin from water. Explanation is needed of the different clinical types of disease met with in different areas; is it one of different parts of the skin being used as the place of entry in different areas, or is it ascribable to different species of worm, or to different degrees of infection, or to the use of different lines of passage in the body? Though the discovery of clinical signs is largely dependent on the doctor's acuteness, "symptomless filariasis" is probably the result of a slight infection, and elephantiasis the end result of long and wide lymphatic blockage. Stress is laid on a gap of knowledge in the life-cycle—What happens to the infective larvae after they enter man? How do they, as so many do, get to the scrotum?

Lecture II is on the problem of microfilarial periodicity. Menon adds a little to the evidence that female worms in the same host are in the same stage of microfilarial development and that in one case microfilariae were absent from the uterus when the worms were removed at 2 p.m. "On the whole, Lane's theory rests on the demonstration of a burial ground where the microfilarial brood in the blood are disposed of every day. This has got to be carried out." [The reviewer suggests again that primarily the theory rests on the evidence for or against simultaneous daily parturition in the female worms. When workers are satisfied as to this, then and only then will they begin an adequate search for the site and means of destruction of microfilariae.] The point is next raised whether parturition is after all a daily event, but may not be the cause of the periodic attacks of filarial fever? What is the stimulus which produces cyclical parturition [or indeed periodicity if this is not due to parturition]? It is significant that in the year 1935 it should be possible for Menon to say rightly "on the whole, histological studies of the lymphatic glands are so few, that it is not possible to decide whether the changes could be directly attributed to toxic and foreign body reactions round the parent worms [or microfilariae] or . . . to a toxic discharge from the worms lying at some distance" or as ACTON and RAO suggest to passage of infective larvae.

Lecture III.—(1) The pathology of elephantiasis including mention of the effects of the injection of sclerosing fluids by HOMANS, DRINKER and FIELD showing the effects of the mechanical factor and of secondary infections. (2) Methods of diagnosis, including the measured drop, the intradermal reaction interfered with in India by present difficulty in getting the antigen, X-rays in which radiograms are correlated with

the results of sectioning, and the adhesion phenomena of PANDIT, PANDIT and IYER. (3) Treatment, of a general vermifugal character which has proved disappointing, by local injection of sulpharsphenamine, and by operation. The last section urges the great need for further accurate and co-ordinated studies, which at last this great subject will evidently receive.

C. L.

- i. DRINKER (Cecil K.), AUGUSTINE (Donald L.) & LEIGH (Octa C.). **On Filtration of Microfilariae by Lymph Nodes.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. June 29. Vol. 29. No. 1. pp. 51–58. With 3 figs.
- ii. KNOTT (James). **The Periodicity of the Microfilaria of *Wuchereria bancrofti*. Preliminary Report of Some Injection Experiments.**—*Ibid.* pp. 59–64.
- iii. LANE (Clayton). **A Note on Periodic Bancroftian Filariasis.**—*Ibid.* July 31. No. 2. pp. 135–142. [16 refs.]

i. *Microfilaria immitis* passes through lymph glands of the dog with comparatively slight hindrance and without phagocytic infiltration of the glands. *Mf. loa* though sheathed travels on a slide faster than the unsheathed *Mf. immitis*. By analogy *Mf. bancrofti* will not measurably be impeded by lymph glands and if mechanically checked in them will not suffer thereby.

Mf. immitis, collected by centrifuging heparinized and haemolysed blood of an infected dog, were resuspended in a mixture of dog serum and normal saline such that the protein content lay between 1·2 and 2·3 per cent., figures normal for the leg lymph of the dog. With precaution for maintenance of its evenness, this suspension was run into the lymph afferent of the popliteal gland of a dog. The outcoming lymph was collected either by cannulation of the efferent lymphatic of this gland or of the thoracic duct. A typical experiment of each sort is detailed in two tables, these show that when 16,141 larvae were run into the popliteal gland during 85 minutes, 125 reached the outgoing vessel and 16,016 did not. Again when 88,252 were run into this gland of another dog during 114 minutes, 1,400 reached the thoracic duct and 86,852 did not. In these last experiments the perfusate was coloured with trypan blue, which had no observable effect on the activity of the embryos. It thoroughly stained both popliteal and iliac glands, and it and embryos appeared in the thoracic lymph at the same time. There was, then, passage of the perfusate through both structures. In entire cross sections of perfused glands 8 μ thick, there were small numbers of embryos, mostly in intermediary sinuses and with evidence of reaction in no case. In 3 experiments microfilariae were imprisoned in the popliteal gland by ligature of the outgoing vessel. "The microfilariae survived this treatment with great success . . . We cannot at present furnish any estimate as to the number that may have escaped from the node by migrating . . . In none of these instances of imprisonment [which reached to 5 days] . . . was there the slightest evidence of phagocytosis." As to motility, paths of travel on a slide plotted out for the unsheathed *Mf. immitis* showed progress of 0·18, 0·16, 0·19, and 0·14 mm. per minute, the blood coming from a heparinized dog; and for the sheathed *Mf. loa* 0·37 mm. "One larva has penetrated the vaseline with the anterior third of its body directed into the vaseline. . . . These observations

show beyond possible question that sheathed microfilariae are capable not only of movement but also of actual travel, and that their travel is forcible as indicated by the organism which penetrated the vaseline. . . . It is reasonable to believe that the ease with which [*Dirofilaria*] traverses lymph nodes would be equalled by *Loa*," and that the embryos of *Wuchereria* would be expected to pass to the blood stream as readily as those of *Loa* with "no serious check in passing through lymph nodes." Further experiments with *Mf. immitis* are in progress.

C. L.

ii. "(1) A series of experiments is reported in which blood containing microfilariae was injected into non-filarial human subjects.

"(2) A method of blood examination for microfilaria is described.

"(3) Microfilariae were found to have great difficulty in passing through the peripheral capillaries.

"(4) Microfilariae are less active in day blood than in night blood. It is suggested that because of this, they are not able to work their way through the capillaries in the daytime, hence the mechanism of nocturnal periodicity.

"(5) In one subject the injected microfilariae lived 14 days and observed typical nocturnal periodicity.

"(6) In another subject who showed clinical signs of filariasis, the injected microfilariae (which were injected into the brachial artery) never passed through the peripheral capillaries. This suggests an acquired resistance to the parasites, and that in an immune patient the microfilariae are stopped in the capillaries and perish there.

"(7) In a subject showing elephantiasis the microfilariae survived only 2½ days."

iii. Clayton Lane deals with the chief points in the two preceding papers and with other matters relative to this important and interesting question—the periodic appearance of embryos of *W. bancrofti* in the peripheral blood.

The author considers first the optimum habitat of the adult filariae, as shown by examination of "focal spots," places which are painful during an attack of elephantoid fever or of lymphangitis in infected persons. Some of these "spots" when examined after excision contain calcified worms. O'CONNOR has related that three-fourths of the filariae were in the periglandular lymph vessels or in the capsule or cortical sinuses of the glands (see also this *Bulletin*, Vol. 29, pp. 427, 765). ROMITI's view that if adult worms are found outside the sex organs they have arrived there after death is discussed and shown to be erroneous by a concrete example to the contrary and one positive must outweigh theoretical negatives.

The author does much to clarify the difficulty by his simile of two escalators, the lymph and the blood, fronting an infective larva after it has penetrated the human skin. If it chooses the former it may be brought to a stop somewhere in the slow lymph current in arm, thigh, leg, or a lymph gland, and there grow to an adult. If it elects for the latter it is carried by the circulation to a "suitable" capillary (a term not definable at present), passes through the vessel wall into a lymphatic in the tissues and there develops. If it does not penetrate the capillary wall it passes on in the blood stream till it either finds a resting place for development or dies.

After birth in the lymph embryos reach the blood by the ordinary route of the circulation or by taking a short cut through the walls

of the lymph and blood vessels. The weight of evidence is against the embryos passing through a lymph gland and in favour of their "by-passing" the gland itself by the use of the new collateral lymph vessels which form in these cases.

DRINKER, AUGUSTINE and LEIGH have argued that embryos of *Dirofilaria immitis* pass easily through the lymph nodes and that "by analogy" those of *W. bancrofti* will do the same, but Clayton Lane shows that their own figures do not bear out the former and that arguments by analogy are not valid evidence, in this instance at least. Of many thousands of larvae injected into the afferent lymph vessel of the popliteal gland less than 1 per cent. appeared in the efferent vessel, 99.2 per cent. were not accounted for; in another experiment nearly the same proportion, 98.4 per cent., were lost. Three possibilities as to their fate are arguable: 1. They were retained undamaged in the gland; 2. They were destroyed in the gland; 3. They had escaped. Section of the glands disproved the first and second of these.

KNOTT's argument that the embryos are less strong in day than in night blood and are kept back in the capillaries by day is not proven, but is moreover disproved by his own experiment of injecting embryos in large numbers into the blood vessels of a man at 10.40 p.m. and examining the blood at intervals over a period of 48 hours; no embryos were found. A second experiment on somewhat similar lines was corroborative of the same findings.

As regards the periodicity Lane's view is a daily parturition of the female worms at about the same hour and not that parturition is more or less continuous. The former hypothesis would account for the recurring wave of embryos in the blood stream, the latter would not. The question as to the site where the embryos are destroyed remains unanswered. [See also this *Bulletin*, 1935, Vol. 32, p. 274.]

H. H. S.

AFRICA (Candido M.), GARCIA (E. Y.) & LAYCO (Jaime). **Periodic Human Microfilaria in the Philippines.**—*Jl. Philippine Islands Med. Assoc.* 1935. Aug. Vol. 15. No. 8. pp. 407-412. [11 refs.]

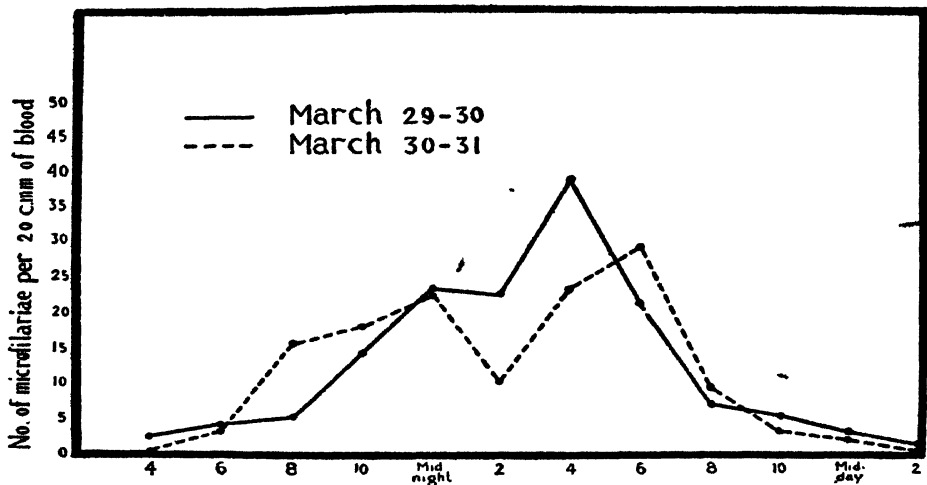
There is in fact periodicity of human microfilariæ in the Philippines.

Counts were made of 2 cmm. of skin blood every 2 hours, at intervals from August to January, in a man who had never left the islands. Periodicity was marked. It is thought that both periodic and non-periodic forms of *W. bancrofti* are possibly present. It is suggested that in this case there may have been 4,585,000 microfilariæ in the whole blood and as to periodicity and its explanation by daily parturition his comment is: "for the daily death of such an enormous number of larvae is bound to cause grave disturbances in the host analogous to the so-called protein shock, which does not seem to occur in filariated persons. Furthermore, the theory seems unbiological, since it would be a piece of great folly on the part of Nature to permit such wholesale death when, clearly, these microfilariæ need to stay longer in the circulation in order to have more chance of getting into the mosquito host." [But in that case man's well being may have been in "Nature's" mind.] C. L.

YEN (C. H.) & CHANG (T. L.). **The Periodicity of *Microfilaria malayi* Brug as observed from a Case in the Lester Chinese Hospital, Shanghai.**—Reprinted from *Lingnan Sci. Jl.* 1935. July. Vol. 14. No. 3. pp. 399-402. With 1 fig.

The periodicity in the two cases tested was marked.

In one of them 20 cmm. of blood was taken two-hourly for 48 hours. The graph shows the numbers of microfilariae.



Periodicity of *Microfilaria malayi* Brug from a Lester Chinese Hospital Case.

[Reproduced from the *Lingnan Science Journal*.]

C. L.

MONTEL (M. L. R.) & TRUONG-VAN-QUE. La carbone animal intra-veineux dans le traitement des accès aigus fébriles de la lymph-angite chronique éléphantiasigène des pays chauds. [**Injection of Animal Charcoal in Elephantoid Fever.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1935. Apr. Vol. 13. No. 3. pp. 271-276.

Three cases are added to that already reported (MONTEL, this *Bulletin*, 1935, Vol. 32, p. 649). In all of them there was equally dramatic disappearance of lymphangitis and fever. They ceased within 24 hours, with immediate relief of the general symptoms and restoration to full health in 3 days.

C. L.

HINMAN (E. Harold). **Studies on the Dog Heartworm, *Dirofilaria immitis*, with Special Reference to Filarial Periodicity.**—*Amer. Jl. Trop. Med.* 1935. May. Vol. 15. No. 3. pp. 371-383. With 1 chart. [16 refs.]

"A report is presented of data on *Dirofilaria immitis* infestation obtained by blood examination and subsequent autopsy of 93 dogs. It has been found that there is no correlation between the numbers of microfilariae in the peripheral blood stream and the numbers of adult female filarial worms present. A single female may account for several million embryos or may be responsible for only a few thousand at 5 p.m. The writer has

been unable to demonstrate the presence of a substance in the salivary glands of four species of mosquitoes which possesses a chemotactic effect upon the embryos of *Dirofilaria immitis*. A dog under observation, in screened animal quarters, continued to exhibit a constantly high number of microfilariae over a period of three years. *Aedes aegypti* will develop the larvae of *Dirofilaria immitis* to an infective stage but in very carefully controlled experiments this species of mosquito was unable to transmit the infection to three dogs. The young larvae, after inoculation into a dog by mosquitoes, must undergo development in some location other than the heart since this organ contains only adult worms or nearly mature ones. It is believed that in the case of the dog heartworm cyclical parturition of the adult female filarial worms is not a major factor in the production of periodicity. This is substantiated by the long life which microfilariae may show following transfusion into an uninfected host and also by the enormous numbers of embryos per female worm which may appear in the dog's blood. Probably normal physiological processes in the dog account for the phenomenon of periodicity of microfilariae."

[Since in the body of the paper the reviewer's opinions are questioned it seems fair to say that his suggestion has been that the first step needed before drawing analogies between the periodicity of *D. immitis* and *W. bancrofti* is to have knowledge of the condition of the uterus of *D. immitis* at different hours comparable to that which O'CONNOR has given for *W. bancrofti*. If there is no such timing of parturition in *D. immitis*, but some secret place of hiding, a series of dogs can be put to death at given hours, and comparative and controlled counts made of the blood of different parts or organs. Indeed these can be punctured while the dog is alive with even greater ease. In the reviewer's opinion surmise should have a smaller place in explanation of periodicity in the dog's worm. The constancy of microfilarial counts from day to day seems to him to be no stronger evidence of the daily reappearance of the same microfilariae in the blood, than would be the idea that the constancy of daily counts of hookworm eggs in the faeces could be evidence that the eggs somehow got back into the intestine from day to day. MANSON hardly originated the theory of diurnal parturition of microfilariae; he condemned MYER's suggestion (1881) of the "possibility of diurnal solution as the end of such embryos as do not come within mosquito range." The fact that in Hinman's paper the approximate number of microfilariae in the blood per female worm discovered varied in 15 dogs from 10,740 to 3,750,945 suggests that worms were living in places other than the heart, as it is stated they may.] C. L.

HINMAN (E. Harold). **Experimental Studies on Filarial Periodicity.**—*Jl. Trop. Med. & Hyg.* 1935. Nov. 1. Vol. 38. No. 21. pp. 265–267. [17 refs.]

"In *Dirofilaria immitis* it is most improbable that cyclical parturition accounts for the phenomenon of filarial periodicity.

"No evidence of cyclical parturition could be found by examination of the uteri of large numbers of female worms at different periods of the day or night. The long life of microfilariae *in vivo* (as shown by transfusion) and *in vitro*, as well as the presence of enormous numbers of microfilariae per female worm, is submitted as evidence in opposition to this theory. The hypothesis of chemotactic effect of salivary secretion upon microfilariae has not been supported by experiments with *Dirofilaria immitis*.

The writer again reiterates his belief that periodicity in the dog heartworm is probably influenced by normal physiological processes in the animal. The elevation of the dog's body temperature as much as 4°F. and maintenance for two or more hours failed to have any effect upon the numbers of microfilariae in the peripheral circulation." C. L.

COUTELEN (F.). La longévité de la filaire *Loa loa* (Guyot 1778) et des embryons de filaires. A propos d'un cas de filariose diurne. [Longevity of *Loa loa* and its Embryos.]—*Bull. Soc. Path. Exot.* 1935. Feb. 13. Vol. 28. No. 2. pp. 126-134. [36 refs.]

A case of *Loa* infection followed up in France for 7 years.

A woman who had left the French Congo in September 1924 first showed Calabar swellings in hands, arms and eyelids in January 1931, but no microfilariae in the day blood on 8 occasions. In April 1931 a *Loa* crossed the conjunctiva and was taken out, 15 days later a second and on 27th November a third did the same and were at once taken out. Next day *Mf. loa* was first seen in the blood at 11.30 a.m. with an eosinophilia of 8 per cent., the note being made that this appearance did not take place till ten months after that of the oedema, and 7 years and 2 months after she had left the Congo. In a table are set out the length of life of the adult worm in the experience of 13 observers—between 4 and 15 years. C. L.

RODHAIN (J.) & VALCKE (G.). Quatre nouveaux cas de parasitisme par *Onchocerca volvulus* chez l'Européen. [Four More Cases of Infestation of Europeans by *O. volvulus*.]—*Ann. Soc. Belge de Méd. Trop.* 1935. Sept. 30. Vol. 15. No. 3. pp. 361-365. With 2 figs.

In all cases microfilariae were present in the fluid from punctured nodules, but in none were they seen in the skin though pruritus was marked in all. In 1 case an injection of 2 per cent. rivanol and 0.5 per cent. of novocaine was made into a nodule. When this was cut out 5 days later the worms were dead and shrunken with invasion by leucocytes. C. L.

D'HOOGHE (M.). Contribution à l'étude de l'onchocercose humaine dans l'Uélé. [Onchocerciasis in Man in Uele (Belgian Congo).]—*Ann. Soc. Belge de Méd. Trop.* 1935. June 30. Vol. 15. No. 2. pp. 159-199. With 12 figs. on 4 plates & 1 map. [5 pp. of refs.]

Blinding onchocerciasis is present in the Lower Uele.

Of adults 88 per cent. show nodules mostly on the trunk and about the pelvic girdle and only 5.7 per cent. on the head. Of 3,448 natives of the place 2.1 per cent. had eye trouble and about 0.5 per cent. were blind. Microfilariae were present in the bulbar conjunctiva in 59 per cent. of those with nodules on the head and in all of those who had eye symptoms. Owing to the presence of other infections dependence cannot be placed on dermal reactions. The skin symptoms leading up to scleroderma are held to be allergic, microfilariae playing quite a secondary rôle in causing them. When these are seen in cerebrospinal fluid the belief is that they have been carried there during the puncturing. Injection of 0.5 to 1 cc. of 5 per cent. thymol in carbon

tetrachloride causes destruction and absorption of nodules. Photographs show the skin conditions and one varicose lymph gland, though whether the last was a pure onchocerca infection is not stated.

C. L.

APPELMANS (M.). Les troubles visuels dans l'onchocercose africaine. [Visual Disturbances in African Onchocerciasis.]—*Rev. Belge Sci. Méd.* 1935. Aug.-Sept. Vol. 7. No. 7. pp. 525-539. [22 refs.]

An account, clinical and pathological, of the "blinding filaria" in Africa.

Three arguments were put forward by BRUMPT when making *O. caecutiens* a species different to *O. volvulus*—medical geography, the situation of nodules, the pathology. They do not seem to Appelmans to be of weight. As he has seen the disease in Africa it has 3 stages. The first is that of the forming of subcutaneous nodules, which are seen on the head in 5 per cent. of cases. In the second, lesions of the skin are seen and with them the presence of microfilariae in the skin. In the third are the eye lesions in 3 stages. The first is with photophobia, much congestion at the limbus and back to the equator of the eyeball, punctiform infiltrations about the limbus, but the centre of the cornea clear; microscopically are seen at the limbus much cellular exudation all round the vessels, the conjunctiva with full vessels, oedema, the outer third of the cornea with blood vessels and cellular exudation mostly in the superficial levels. In the second stage of the eye lesions there is inflammation of iris, ciliary body and choroid with some loss of sight caused by bodies, some of them microfilariae, in the vitreous, and the usual lesions of iritis and choroiditis. The third, happily not always come to, is blindness with atrophy of the eyeball, entrance of microfilariae into the sheath of the optic nerve and lesions inside it.

Microfilariae may have round them tissue which is quite healthy. Their ill-effects are perhaps due to their movements and to toxins. Most of them are seen at the limbus, in the ciliary body and conjunctiva, in the nerve sheath but not in the nerve or retina, there are few in the cornea or sclera. That is they are mostly present where connective tissue is loose and not made up of parallel bundles.

C. L.

JOYEUX (Ch.), SÉDAN (J.) & ESMÉNARD (J.). Un cas d'onchocercose contractée à la Côte d'Ivoire, avec complications oculaires. [Ocular Symptoms in a Patient with Onchocerciasis in the Ivory Coast.]—*Bull. Soc. Path. Exot.* 1935. June 12. Vol. 28. No. 6. pp. 435-438.

The ocular trouble seems to have been limited to the conjunctiva, since vision was normal.

A fosterer of 35 had a skin eruption, a nodule under the skin over the left scapula and some lesions on the left conjunctiva. These last were made up of an elongated body 7 mm. long by 1 mm. broad, motionless, yellowish and pointed at one end, and of a dozen small rounded bodies like yellow grapes some of which were also present in the right conjunctiva. Three of these were cut out, two placed in saline without emigration of embryos, and the third sectioned. It proved to be a granuloma with many giant cells. The scapular nodule contained a

tangle of *O. volvulus* worms. There were no microfilariae in the blood and the eosinophilia lay between 47 and 35. A detailed note will be published in *Annales d'Oculistique*. C. L.

OSBORN (H. A.). **Onchocerciasis in England.**—*Lancet*. 1935. Nov. 2. p. 1000.

The title of the paper makes clear the author's view of the case.

A man of 62 who had never been out of Liverpool had for 5 years a scrotal swelling. Its quick increase in size in the last six months had made him uncomfortable. A hydrocele was present. Orchidectomy was undertaken. In cystic fibrous tissue was seen a larval nematode measuring 240 μ by 7 μ , without a sheath and with the tip of the tail free from the nuclear column. There was no eosinophilia and no microfilariae in the blood. The diagnosis was onchocerciasis, the man was a cotton porter at the docks and the suggestion is that he was bitten by an infected *Simulium* which came to the country in a cargo ship. [The reviewer by courtesy of Dr. Osborn has seen the slide. The solitary larva is complete though coiled, lies in a recess in the tissue, has a long tail sharply pointed and the nuclear column is not reminiscent of that of *Mf. volvulus*. There were apparently no nodules under the skin and no examination of lymph from the dermis was made for embryos. The reviewer has seen hundreds of sections made by O'CONNOR and has not once seen a whole microfilaria in them. He regrets that on the grounds put forward the claim is made for this as a clear case of onchocerciasis got in England.] C. L.

LINDBERG (K.). Un ver de Médine siégeant au voile du palais.—*Bull. Soc. Path. Exot.* 1935. June 12. Vol. 28. No. 6. pp. 438-441.

CASTENS (E.). Ueber Gnathostoma beim Menschen in Siam. [**Gnathostoma Infection of Man in Siam.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Aug. Vol. 39. No. 8. pp. 337-342.

The author's experience is based on about 40 cases of this infection.

The outstanding points in it are, eosinophilia without helminths in the intestine, and frequently with circumscribed transitory swellings. The percentage of eosinophilia has been between 19 and 82, and it is generally, but not always, highest early in the infection, of neutrophils 11 to 62 and these commonly have a shift to the left, of lymphocytes 7 to 33. The swellings may be as big as the palm of the hand, are generally right under the skin with redness and pain, but may be deeper, lasting from 2 to 3 days to 1 to 4 weeks and then come to view again not far from where they were first seen. Lung and brain symptoms have been seen in these infections. C. L.

WAITE (C. H.) & GORRIE (Rachael). **A Gongylonema Infestation in Man.**—*Jl. Amer. Med. Assoc.* 1935. July 6. Vol. 105. No. 1. pp. 23-24. With 1 fig.

A male gongylonema was taken by a white man of 30 from the "roof of his mouth" which had been sore for 3 months.

The authors' belief is that it is the first male gongylonema got from man. Six weeks later the nervous symptoms which the man had had

were gone and the palate had healed. Some measurements of the worm are given. The microphotographs make it clear that the worm is a gongylonema, but little more. C. L.

FAUST (Ernest Carroll) & MARTINEZ (William H.). **Notes on Helminths from Panama. II. Rare Human Nematode Eggs in the Feces of Individuals from the Chagres River, Panama.**—*Jl. Parasitology*. 1935. Oct. Vol. 21. No. 5. pp. 332-336. With 3 figs. [10 refs.]

Eggs of *Capillaria hepatica* and of *Gongylonema* were seen in faeces and were probably contaminations. C. L.

FRASER (W. A. Carr). The Comparison of the Efficiency of Anthelmintics. —*Parasitology*. 1935. Oct. Vol. 27. No. 4. pp. 465-475.

TROPICAL DERMATOLOGY.

A REVIEW OF RECENT ARTICLES, II.*

Blastomycosis.—Since 1931 CARRIÓN¹ has seen six cases of Chromoblastomycosis in Puerto Rico. In one of these, a male white agricultural labourer, the clinical picture differed from that usually seen. The disease first started on the left wrist some twenty years ago and had since then slowly involved most of the hand, forearm and elbow. The lesions were patchy and psoriasiform, intermingled with extensive zones of scarring. No nodules or vegetative masses were present. The histological changes were typical but the fungus isolated by culture appeared to constitute a new species and will be the subject of a later communication. In the meantime it is proposed to call it *Hormodendrum compactum*. The first case of Chromoblastomycosis to be recognized in Uruguay is described by MACKINNON.² He also reviews the disease generally and in particular from the point of view of world distribution. ROSENTHAL³ has published some details of a remarkable case of blastomycosis seen in Philadelphia, where the infection is rare. The patient was an infant aged six months in whom the lesions had appeared three weeks before coming under observation. Apparent cure resulted from six months' treatment with potassium iodide and X-rays. The greater part of the paper is devoted to details of histology and morphology, the organism being the *Cryptococcus gilchristi*. TOTZE⁴ has written a long paper concerning the pathology of a specimen, a small skin tumour, obtained from Liberia. No clinical notes are appended but the microscopical features of the nodule and of the mycotic elements are given in very great detail. The fungus presents appearances which would seem to relate it to both the yeasts and the coccidioides. The paper also describes a new method of fixing such preparations which allows the subsequent use of a great variety of stains.

Mycetoma.—During the past twelve months two cases of "Madura foot" have been detected in Eastern Europe. ILDRIM⁵ reports the first case from the U.S.S.R., a native girl from the Northern Caucasus. No clinical details are given but the fungus, which proved to be of the black type, is described very fully. A well-illustrated article by

* For the first of this series see Vol. 32, p. 181.

¹ CARRIÓN (A. L.). Chromoblastomycosis. Preliminary Report on a New Clinical Type of the Disease caused by *Hormodendrum compactum*, Nov. Sp.—*Puerto Rico Jl. Public Health & Trop. Med.* 1935. June. Vol. 10. No. 4. pp. 543-545. With 2 figs. on 1 plate. [Spanish version pp. 546-548.]

² MACKINNON (J. E.). Estudio del primer caso uruguayo de cromoblastomycosis y 'revista crítica' sobre la enfermedad. [A Study of the First Uruguayan Case of Chromoblastomycosis and a 'Critical Review' of the Disease.]—*Arch. Urug. Med.* 1934. Vol. 2. pp. 201-226. With 8 figs. [Summarized in *Rev. Applied Mycology*. 1935. Aug. Vol. 14. Pt. 8. p. 509.]

³ ROSENTHAL (J. M.). Blastomycosis in an Infant Six Months Old.—*Jl. Lab. & Clin. Med.* 1935. Aug. Vol. 20. No. 11. pp. 1164-1165.

⁴ TOTZE (Richard). Beitrag zur Pathologie r exotischen Blastomycosen.—*Ztschr. f. Parasitenk.* 1935. Sept. 11. Vol. 7. No. 6. pp. 679-701. With 16 figs. [1 page of refs.]

⁵ ILDRIM (D. J.). Madurapilz im Nordkaukasus (U.S.S.R.).—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Aug. Vol. 39. No. 8. pp. 348-349.

BORDJOŠKI and MILOCHEVITCH⁶ deals with a case seen in Northern Jugo-Slavia. The patient was a woman, 42 years of age, who injured her left foot some 28 years before. There was no obvious lesion at the time but the foot thereafter showed occasional swelling until the dorsum became discoloured and exfoliating two or three years after the accident. The area now bled easily on slight trauma and enlargement of the whole foot became apparent. A small tumour was noticed over the fourth toe when the patient was aged about 20 and some surgical operation was then performed. It is noteworthy that until now the patient had never left her native village. Subsequently small, livid, red nodules appeared on the dorsum and some of these broke down to discharge a yellowish white fluid; a few of the consequent sinuses healed. About six years ago small, colourless grains were noticed in the discharge, whilst pain and swelling increased. When the woman was seen by the authors she was cachectic and the left leg was somewhat atrophied. The foot itself was enlarged and all its joints, including the ankle, were fixed. The sole was normal in colour but the dorsum was patchily dark grey and red with scattered white scars. There were very many maize-sized nodules. Sinuses discharged a colourless or blood-stained fluid containing pale yellow granules of varying sizes. The left inguinal glands were swollen, adherent and painful, whilst radiography demonstrated irregularity and thickening of bone together with destruction and osteoporosis. Injections of an iodide caused local and general reaction of such severity that amputation was ultimately performed at the patient's own request. Minute morphological and cultural details of the fungus are described, but experimental inoculation into rabbits proved unsuccessful. It would seem that the organism is new, so that the authors propose to call it *Actinomyces brumpti* n. sp.

Acladiosis and Paracladiosis.—One of the many excellent articles in the special dermatological number of the *Journal of Tropical Medicine and Hygiene* has been written by CASTELLANI and JACONO⁷ on this subject. The disease has been seen in Malay, South America, Siam and Ceylon. In a typical example ulcerations may occur anywhere on the body but are less common on the head, palms and soles. Each ulcer is sharply defined, round or oval and its size may be from that of a sixpence to that of a half-crown; it secretes an abundant purulent fluid which dries to form thick, yellow, rupioid crusts. Removal of these crusts shows the bases of the ulcers to be studded with rather prominent red granulations. Occasionally gumma-like swellings may also be present. The disease is chronic, may be accompanied by slight fever and later gives rise to a secondary anaemia. Treatment consists of large doses of potassium iodide by mouth and mild antiseptic lotions locally. The causative fungus is the *Acladium castellanii*. Recently a Chinaman was seen whose disease matched the above description except for the fact that the ulcerations were neither so definite nor so deep. Potassium iodide did not have much effect and Castellani's fuchsin paint proved the most efficient local dressing.

⁶ BORDJOŠKI (M.) & MILOCHEVITCH (S.) Sur un cas de pied de Madura en Yougoslavie produit par une espèce nouvelle d'*Actinomyces*, *Actinomyces brumpti* n. sp.—*Ann. Parasit. Humaine et Comparée*. 1935. Jan. 1. Vol. 13. No. 1. pp. 36–51. With 10 figs. on 2 plates. [11 refs.]

⁷ CASTELLANI (Aldo) & JACONO (Igino). Acladiosis and Paracladiosis.—*Jl. Trop. Med. & Hyg.* 1934. Dec. 1. Vol. 37. No. 23. pp. 360–363. With 2 plates (1 coloured).

A different fungus was found in this case, *Ascothrica chartarum* Berkeley 1838, var. *orientalis* Castellani and Jacono 1934. The patient declared that the infection is not rare in Central China (Shenshi).

Piedra.—WOLFF and GERLACH⁸ describe a case seen in Batak, Dutch East Indies, a man whose scalp was heavily infected by a fungus which culture proved to be a *Trichosporon*. The disease was rapidly cured by means of several thorough washings with warm soapy water. No other cases were known or could be discovered in the neighbourhood.

Pinta.—There has now been published by Fox⁹ a review of the work carried out in Mexico between the years 1929 and 1931 by the commission appointed under the leadership of URUEÑA. The disease is endemic in the southern half of the Republic, where nearly 11 per cent. of the total population of 2,500,000 were found to be affected. Cases of the blue type were 67,380 in number, of the white type 57,277, of mixed types 51,731, of lead-coloured type 27,281, together with smaller numbers of violet, black, red and yellow varieties. The mucous membranes were affected in 72,873 of these 270,685 patients, but scaling was present only in 90,000. Constitutional symptoms were very variable and the value of their consideration is regarded as doubtful. The disease is most common between the ages of 30 and 40. No conclusions could be drawn as to the influence of occupation, avitaminosis or the proximity of rivers. The idea of contagion predominated, insect bites being frequently suggested. It is said that the same infection is found in dogs, horses and pigs in some areas. FERNANDO¹⁰ describes the lesions seen in a Malay boy, 11 years of age, who had never been out of Ceylon. A small, black patch appeared on the right cheek some four years before. This gradually enlarged and became darker until about six months had elapsed when the centre became reddish. Later the patch turned white and new, roundish areas with sharp outlines developed below the eyelids and behind the ears. Itching was intense. Prolonged treatment with 3 per cent. resorcin and 2 per cent. salicylic acid in soft paraffin cleared the lesions but did not affect the achromia. The *Aspergillus* cultures are also described.

Tinea imbricata.—The history of this disease is dealt with by CASTELLANI¹¹, who starts from Dampier's description in "A Voyage Round the World," published in 1789. The four species of fungi are discussed and the author claims that at least two species must be admitted, *Endodermophyton tropicale* and *E. indicum*. There are four principal clinical types, concentric, diffuse, moulting and mixed. He also describes a very chronic example seen in an Englishman who first contracted the disease in 1916 in Arabia. The fuchsin paint has now almost cured him, all previous applications having failed.

⁸ WOLFF (J. W.) & GERLACH (J. H. A.). Een geval van Piedra.—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1935. Mar. 19. Vol. 75. No. 6. pp. 515-518. English summary (7 lines).

⁹ FOX (Howard). A Census of Mal del Pinto in Mexico.—*Arch. Dermat. & Syph.* 1935. Feb. Vol. 31. No. 2. pp. 227-229.

¹⁰ FERNANDO (S. E.). Pinta. Notes on a Case occurring in Ceylon.—*Jl. Trop. Med. & Hyg.* 1934. Dec. 1. Vol. 37. No. 23. pp. 375-376. With 2 text figs.

¹¹ CASTELLANI (Aldo). Tinea Imbricata (Tokelau). A Short General Account with Report of a Case in a European.—*Jl. Trop. Med. & Hyg.* 1934. Dec. 1. Vol. 37. No. 23. pp. 363-368. With 1 fig. & 4 plates (2 coloured). [31 refs.]

Favus.—CATANEI¹² reports his observations of 23 native children seen in the plain of Mitidja, Algeria. Their ages varied from 2 to 13 years and they were all re-examined at odd times from 2 to 7 years after the diagnosis of favus of the scalp had first been made. No treatment of any kind was ever given. Two cases were found to have healed spontaneously within twelve months, two within two years, one within three years and one within four years. Three other children were seen in whom the disease had almost disappeared. Therefore the infection does often die out spontaneously without leaving any appreciable scarring.

Tinea tonsurans.—A scarring ringworm of the scalp, *Tinea decalvans perstans*, is seen from Ceylon to China. CASTELLANI¹³ describes these cases, which are due to *Trichophyton violaceum* Bodin var. *decalvans* Castellani. The scalp shows one or more patches covered with a very large number of heaped-up, white, branny scales. After a time both scales and hair disappear to leave smooth bald patches. These areas remain permanently bald although the actual amount of scarring is not heavy. Microsporon infections of the scalp are very rare in the Mediterranean basin and CATANEI¹⁴ states that only three have been hitherto noted in Algeria since 1906. Recently he has found eight more cases in Algiers, two of whom were Europeans, one a Jew and the rest natives. In every case the offending organism proved to be *M. felineum*. The same author¹⁵ has been trying to determine the resistance to reinfection by ringworm. The animals used were guinea-pigs and the fungus was *Trichophyton asteroides*. He found that when the animal shows local inflammatory reaction to the infection an immunity is produced and this is proved by the difficulty experienced in producing reinfection over fourteen months. Those animals which have been infected and which later react strongly to trichophytine, are also immune for long periods. The acquisition of immunity is slow and is never attained before the fungus has actually attacked the hairs. Attempts to produce immunity by injections of trichophytine gave very poor results. Inoculation of the fungus by means other than the skin (e.g. intraperitoneal) also gave rise to very little resistance. It would also seem to be true that some dermatophytes never produce immunity.

Epidermophytosis.—When any subject is dealt with by the observer who originally described or discovered the cause of the disease in question, the article must prove of great interest. WHITFIELD¹⁶ has contributed such a paper on epidermophytosis, but his remarks are restricted to treatment. It is important to note that he believes cure may be effected in most cases, in the absence of affection of the nails. Two other great difficulties present themselves; the fungus may be

¹² CATANEI (A.). Sur la guérison naturelle précoce du favus.—*Bull. Soc. Path. Exot.* 1935. May 8. Vol. 28. No. 5. pp. 344-345.

¹³ CASTELLANI (Aldo). Tinea Decalvans Perstans.—*Jl. Trop. Med. & Hyg.* 1934. Dec. 1. Vol. 37. No. 23. pp. 368-369. With 5 figs. on 1 plate.

¹⁴ CATANEI (A.). Huit nouvelles observations algériennes de microsporie.—*Arch. Inst. Pasteur d'Algérie.* 1935. June. Vol. 13. No. 2. pp. 216-218.

¹⁵ CATANEI (A.). La résistance aux réinfections dans les teignes (étude expérimentale).—*Arch. Inst. Pasteur d'Algérie.* 1935. June. Vol. 13. No. 2. pp. 219-232. With 1 fig. & 1 plate.

¹⁶ WHITFIELD (Arthur). Some Notes on the Treatment of Epidermophyton Infection.—*Jl. Trop. Med. & Hyg.* 1934. Dec. 1. Vol. 37. No. 23. pp. 353-355.

so deeply embedded in thick horny tissues that the fungicide cannot get at it and there seems to be a stage where very resistant spores are formed. This resting stage may be suspected clinically in patients with exfoliation but no vesiculation. In specimens taken from such a case there may be seen thick-walled, round or oval elements between segments of mycelium or at the end of a strand. In order to avoid infection when in contact with known cases it is important never to walk barefooted and never to borrow socks or slippers, for the disease is spread by bath-mats, Turkish baths, etc. An infected patient should take appropriate precautions to avoid spreading the fungus and should wear special slippers in the bath-room. These have loofah soles and bath-towel uppers; they can be sterilized by boiling. The ordinary socks may be protected by wearing thin cotton socks or toe-guards under them. The feet should be dried with "cotton roll" which can be destroyed subsequently. Locally many applications are of value in different cases but on the whole he recommends the following ointment and lotion:—

Acid. benzoic. ...	gr. 25	Acid. benzoic. ...	dr. 1½
Acid. salicyl. ...	gr. 15	Acid. salicyl. ...	dr. 1
Paraff. moll. ...	dr. 2	Acetone ...	oz. 1
Paraff. dur. ...	gr. 15	S.V.M.I. ad ...	oz. 4
Ol. coc. nucis ad	oz. 1		

In chronic cases where there is not much ulceration the following prescriptions are often useful:—

Cupri nitrat. ...	gr. 40	Liq. ferri perchlor. ...	dr. 1
Acid. benzoic. ...	dr. 1½	Alumin. chlorid. ...	dr. 2
Acetone ...	oz. 1½	Acid. hydrochlor. ...	dr. 1
S.V.M.I. ...	oz. 5½	dil. ...	dr. 1
Aq. ad ...	oz. 8	Aq. destill. ad ...	oz. 4

Treatment of this affection is also dealt with by GARCIA¹⁷ who experimented on the students in the College of Medicine in Manila. He treated 20 cases with formalin and claims 100 per cent. cure where the solution was over 25 per cent. in strength. With a 50 per cent. solution the average number of applications which attained this desirable result was but four. Wright's stain (methyl blue in methyl alcohol) was used in 15 cases. Cure resulted after six applications of the undiluted stain. The author gives no statement as to the period over which the patients were observed after their apparent recovery. He also makes the following astounding statement, "among the physical therapeutic agents X-ray is still the best." [It is true that radiotherapy allays eczematization but it does not kill the fungus. It is surprising how much misapprehension still exists on this score.] PEIRIER and RAYMOND¹⁸ have written in praise of Vlemingckx's solution and ointment, each of which contains a mixture of the polysulphides of calcium. Full details are given as to the methods of manufacture of these preparations. In Indo-China these applications have proved their value in all parasitic diseases, including those due to fungi. GRÜTZ¹⁹ has written of his experiences in Bonn.

¹⁷ GARCIA (Eusebio Y.). Treatment of Tricophytosis of the Feet by Formalin and Wright Stain.—*Jl. Philippine Islands Med. Assoc.* 1935. May. Vol. 15. No. 5. pp. 273-276.

¹⁸ PEIRIER & RAYMOND. Solution de sulfure de calcium (Vlemingck) contre les dermatoses parasitaires. Note thérapeutique.—*Bull. Soc.-Méd.-Chirurg. Indochine.* 1934. Aug.-Sept. Vol. 12. No. 7. pp. 727-728.

¹⁹ GRÜTZ (O.). Ueber die Epidermophytie.—*Med. Klin.* 1935. Sept. 13. Vol. 31. No. 37 (1604). pp. 1189-1192. With 3 figs. [21 refs.]

He does not believe that transmission in swimming-baths is really serious. Certainly his bacteriological investigations in such places have not been very successful in the detection of these fungi. Some 693 cases seen in Buda-Pest during the last 15 years have been analysed by BALLAGI²⁰. All were under clinical suspicion and in only 167 was he unable to prove the presence of fungus. There were 41 classical examples, sharply defined and having pustules. Interdigital erosions only were seen in 255 and onychomycosis occurred in 87. There were 44 cases of yeast infections, all of which gave positive reactions to levurine. CARRIÓN²¹ reports two cases of infection of the toes in Puerto Rico. Both were due to *E. floccosum*, which had never been previously detected. The fungi which had always been found before were *T. rubrum* and *T. gypseum*. A well-illustrated article which gives full mycological details.

The Culture of Fungi.—A method of recovering typical cultures from old growths which have become downy and pleomorphic has been very fully described by ACTON & DEY.²² This pleomorphism in old laboratory cultures has always been a difficulty in the study of mycology. Therefore the authors first confirmed the results of other workers who used such natural media as leather, bones, etc. Their experiences decided them to reduce the favourability of the conditions under which the cultures were made. For the preliminary subcultures feathers are mounted on plaster of Paris blocks and put into test-tubes containing a little water. Cotton-wool plugs are used. The whole is then sterilized in an autoclave at 120°C. Material from pleomorphic cultures is then inoculated on the rachides of the feathers. These subcultures grow well whilst water is still present and at first are of the *duvet* type. Gradually, however, the growths dry and shrink, becoming more and more adherent after the water has dried up. After being kept in the dry tubes for one month specimens are inoculated into different standard media. It is found that the fungi now grow true to type, having lost all pleomorphic features. It is suggested that in dry feather culture spores become dominant. Their germination results in true cultures whereas reproduction from mycelium gives rise to pleomorphism. Similar effects have been found with old cultures in Sabouraud's medium, cultures which had become dry with age.

Other Fungus Infections.—HANSMANN & SCHENKEN²³ report a very curious case in a white, middle-aged man. The eruption first appeared behind the knees in 1917 and gradually spread. In 1931 there was a dry, scattered, papular, itching rash which had one year later spread over the entire body as a mixture of papules, scales and ulcers of 3 to 4

²⁰ BALLAGI (Stephan). Ueber Hand- und Fussmykosen mit besonderer Berücksichtigung der mykotischen Dyshidrose.—*Med. Klin.* 1935. Sept. 13. Vol. 31. No. 37 (1604). pp. 1204-1205.

²¹ CARRIÓN (A. L.). Observations on Dermatomycosis in Puerto Rico. Further Report on the Etiology of Epidermophytosis.—*Puerto Rico Jl. Public Health & Trop. Med.* 1935. Mar. Vol. 10. No. 3. pp. 255-261. With 7 plates. [Spanish version pp. 263-269.]

²² ACTON (H. W.) & DEY (N. C.). A Simple Method of recovering Typical Cultures of Dermatophytes from Pleomorphic Growths.—*Indian Med. Gaz.* 1934. Nov. Vol. 69. No. 11. pp. 601-604. With 3 text figs. & 12 figs. (5 coloured) on 2 plates.

²³ HANSMANN (G. H.) & SCHENKEN (J. R.). A Unique Infection in Man caused by a New Yeast-like Organism, a Pathogenic Member of the Genus *Sepedonium*.—*Amer. Jl. Path.* 1934. Nov. Vol. 10. No. 6. pp. 731-738. With 9 figs. on 4 plates.

cm. diameter. The most recent ulcers were irregular and showed a tendency to confluence; the mucous membrane of the mouth was thickened. The man was very emaciated but all general and pathological examinations were negative except for the results of biopsy. The skin showed a chronic inflammatory process with yeast-like organisms both free in the tissues and phagocyted. Despite all treatment death ensued rapidly. Post-mortem there were fibrotic, fatty or necrotic changes in many organs. The same organisms were found in the lungs, adrenals and lymph glands. Cultures were similar to those of *Oidium gilchristi*, but differed therefrom in that the spores were large and spiculated whilst the mycelium was delicate. The organism also proved pathogenic to dogs, rabbits, guineapigs and rats. At the moment it is proposed to classify it with the genus *Sepedonium*. SARTORY, SARTORY, MEYER & WEISS²⁴ have published a paper which deals in detail with a yeast, obtained from scales which have been procured from natives suffering from skin disease in French Equatorial Africa. They propose to name the organism *Blastodendron schweitzeri* n. sp. Unfortunately no clinical descriptions are included in this paper.

Verruga.—As it is now proved that verruga and Oroya fever are but different types of the same infection, Fox²⁵ proposes that the entire process be known as Carrion's disease in honour of the student who lost his life after a voluntary inoculation. The malignant type (Oroya fever) is restricted to certain parts of Peru and gives rise to a profound anaemia more rapidly than does any known condition other than haemorrhage. The benign type differs from all known dermatoses. The skin shows miliary papules arising on tiny petechial spots; these papules gradually increase in size and eventually the older lesions become pedunculated. The eruption may occur anywhere on the body but it tends to attack the extensor surfaces of the limbs more severely and to leave the palms and soles free. Sometimes a few hard subcutaneous nodules are seen and the mucous membranes may be affected. The causative organism is *Bartonella bacilliformis*. Infection with one type of the disease produces immunity to the other type. The insect vector (a species of phlebotomus) has been discovered and the existence of a plant reservoir is possible. No specific treatment is known.

Epidemic Dropsy.—Cutaneous manifestations were very prevalent in the 1934 outbreak in Bengal and its adjacent States. CHOPRA & CHAUDHURI²⁶ report 15 such examples out of 39 cases. Of these, 9 showed an intense erythema almost purple in colour, over the extremities and abdomen. "Sarcoids" were seen in 4 patients. These were sessile, pedunculated, ulcerated or fungating when fully developed, but they start as minute red papules which gradually enlarge and become vascular. The largest seen measured 1½ inches in diameter. One case showed erythema and "sarcoids," whilst another suffered from erythema together with pigmentation of the face, hands and feet.

²⁴ SARTORY (A.), SARTORY (R.), MEYER (J.) & WEISS (R.). Etude d'un champignon levuriforme nouveau isolé d'une dermatomycose tropicale.—*Bull. Acad. Méd.* 1935. Apr. 16. 99th Year, 3rd Ser. Vol. 113. No. 15. pp. 486-488.

²⁵ FOX (Howard). Verruga Peruana (Carrion's Disease) based on Personal Experience in Peru.—*Jl. Amer. Med. Assoc.* 1935. Mar. 23. Vol. 104. No. 12. pp. 985-990. With 6 figs. [31 refs.]

²⁶ CHOPRA (R. N.) & CHAUDHURI (R. N.). Cutaneous Manifestations of Epidemic Dropsy. Part I. A Clinical Study.—*Indian Med. Gaz.* 1935. Sept. Vol. 70. No. 9. pp. 493-496. With 4 coloured plates.

The same authors, together with PANJA,²⁷ have also studied the histology of the above signs. The chief changes occur in the blood vessels; these are dilated and surrounded by proliferated endothelial cells. Sometimes there is formation of new capillaries which give rise to the "sarcoids." Experimental cultures and inoculations into volunteers and monkeys all gave negative results. [It is a pity that the term "sarcoids" has been used to describe the lesions which are essentially haemangiomas in structure.]

Animal Parasites.—BOYÉ and RIVIEREZ²⁸ report a curious rash from French Guiana. It consisted of a "run" 1½ cm. in length on the left cheek, the older part of which showed serous scabs whilst the advancing point surmounted fine vesicles. An acarus was extracted and proved to be a male *Tarsonemus*, but the source of the infection remained obscure despite all investigations. The greater part of the article describes the microscopical appearances of the mite in great detail. A very severe case of Norwegian scabies is described by FIALHO,²⁹ the subject being the emaciated corpse of an old woman who had died of tuberculosis in a hospital in France. The clinical appearances were severe but typical. Excellent microphotographs help to support the author's contention that this acarus is indistinguishable from the *Acarus scabiei*. That mites affect poultry and many wild birds is well-known but it has been left to LAWRENCE³⁰ to describe a series of cases of human infection. These occurred in Australia and the skin changes were characteristic of parasitic infections. These mites (*Dermanyssus avium et gallinae*) also live on sparrows, starlings and pigeons, whose abandoned nests they may leave to invade a house. The same paper also deals with trichomes (*i.e.*, minute hairs, scales, etc., from plants) and in particular with those shed from the plane trees of Melbourne. These spicules become caught in the material of underwear, shirt collars, etc., when they can cause itching eruptions, which look, however, as though they were due to external irritation. CAWSTON³¹ deals with "Creeping eruption" as seen on the Natal coast where sand larvae are common within ten feet of the edge of water in the mangrove marshes. They concentrate on wet banks, in depressions and ditches, whilst their development is favoured by humidity and decaying leaves. The *Ancylostoma braziliense* is the known cause and is a common hookworm of domestic pets in Natal. The movements of the larvae cause little discomfort but severe irritation is felt at the end of the "tunnel" where there is an intense inflammatory reaction after the larva has passed farther on. Good results are obtained by freezing with carbon

²⁷ CHOPRA (R. N.), CHAUDHURI (R. N.) & PANJA (D.). Cutaneous Manifestations of Epidemic Dropsy. Part II. A Histopathological Study.—*Indian Med. Gaz.* 1935. Sept. Vol. 70. No. 9. pp. 496-498. With 11 figs. on 2 plates.

²⁸ BOYÉ (R.) & RIVIEREZ (M.). Un cas de dermatose accidentelle du type sarcop-tique, provoquée par un *Tarsonémus*.—*Bull. Soc. Path. Exot.* 1934. Oct. 10. Vol. 27. No. 8. pp. 759-762. With 1 fig.

²⁹ FIALHO (Amadeu). Sur un cas de gale norvégienne.—*Ann. Parasit. Humaine et Comparée.* 1934. Nov. 1. Vol. 12. No. 6. pp. 472-481. With 1 text fig. & 10 figs. on 5 plates.

³⁰ LAWRENCE (Herman). The Pathogenicity of *Dermanyssus avium et gallinae* and of Trichomes in the Human Being.—*Med. Jl. Australia.* 1935. July 6. 22nd Year. Vol. 2. No. 1. pp. 16-20. With 6 figs.

³¹ CAWSTON (F. G.). Creeping Eruption at the Natal Coast.—*Jl. Trop. Med. & Hyg.* 1934. Dec. 1. Vol. 37. No. 23. pp. 374-375.

dioxide snow or by soaking lint in ethyl acetate and afterwards covering this dressing with an impervious material.

Dermatitis venenata.—In the Northern Argentine a disease has been known for a long time under the local name of "el páaj." DI LULLO³² has now dispersed the legends attaching to the eruption and proved it to be due to contact with a tree known as the "coloured quebracho," a member of the *Anacardiaceae* whose scientific name is *Schinopsis lorentzii*. The typical eruption consists of reddish macules surrounded by hardish papules and a few vesicles which sometimes become purulent. There is some diffuse, painful oedema accompanied by slight temperature, malaise, anorexia and headaches. There is also painful enlargement of the glands draining the affected area; they never suppurate, however. The rash has been reproduced experimentally by rubbing the skin with leaves, flower, fruit, alcoholic extract of leaves and by using the distillate obtained after boiling them with water.

Xeroderma pigmentosum.—Two examples in the same family are described by BELISARIO.³³ The skin changes were characteristic in the brother and sister, aged 8 and 14 years respectively. In both the disease started in infancy and in both there appeared partial loss of function of the left hand early in childhood. The wrist is flexed to a right angle and there is loss of use and control of the fingers, but no sensory changes are apparent. Pathological investigations were negative.

Keratoma plantare sulcatum.—A description of this disease as seen in Dutch Guiana is given by AARS.³⁴ During the rainy season the thickened horny layer of the soles develops numerous holes of different sizes and depths. Furrows may appear later but all these lesions never spread deeper than the horny layer. Accumulated dirt then makes these depressions stand out against the yellowish skin with marked clarity. The changes start early in life and are probably non-follicular forms of primary hyperkeratosis. No evidence has been found to support the contention that it may be due to yaws, syphilis or any mycotic infection.

Prickly heat.—BOULNOIS³⁵ writes about the four skin diseases which are particularly prevalent in the humid climate of Bengal. Epidermophytosis, Coolie itch (see ACTON and MCGUIRE, this *Bulletin*, 1929, Vol. 26, p. 682), furunculosis and prickly heat are dealt with. In the last condition the author is successful with the following treatment. After a thorough bathing and scrubbing there is applied a lotion which consists of 1 to 40 per cent. formalin and 0.5 per cent. menthol in 70 per cent. alcohol or eau de Cologne. The lotion may be dabbed on three or four times a day.

³² DI LULLO (Orestes). "El páaj." Une nouvelle dermatite vénéneuse.—*Rev. Sud-Américaine de Méd. et de Chirurg.* Paris. 1934. Sept. Vol. 5. No. 9. pp. 513-523.

³³ BELISARIO (John C.). Two Cases of Xeroderma Pigmentosum occurring in the Same Family.—*Med. Jl. Australia.* 1935. Aug. 3. 22nd Year. Vol. 2. No. 5. pp. 148-150. With 6 figs.

³⁴ AARS (Charles G.). Keratoma Plantare Sulcatum (Castellani).—*Jl. Trop. Med. & Hyg.* 1934. Dec. 1. Vol. 37. No. 23. pp. 372-373. With 1 fig.

³⁵ BOULNOIS (J.). A propos de quatre affections de la peau communes à l'Européen et à l'indigène dans les pays tropicaux à chaleur humide et en particulier le Bengale.—*Rev. Méd. et Hyg. Trop.* 1935. July-Aug. Vol. 27. No. 4. pp. 202-213. With 1 fig.

Influence of Climate.—The effects of climate on surgical skin conditions in Egypt are dealt with by KNIPFER.³⁶ In particular he considers the electrical and hygrometric conditions and finds that boils, whitlows, abscesses and adenitis show a greater incidence during August and September, the months when the *absolute* humidity is at its greatest. LAWRENCE³⁷ has studied the same subject in Australia, but has paid special attention to keratoses, rodent ulcers and epitheliomata. These are all far more common in Australia than they are in the British Isles or the United States. The sun's rays and low humidity both play a part. Pigment undoubtedly protects the skin as these growths are never seen in the aborigines.

M. Sydney Thomson.

³⁶ KNIPFER (A.). Relation of Electrical and Hygrometric Conditions of the Atmosphere to Surgical Skin Infections in Egypt.—*Jl. Trop. Med. & Hyg.* 1935. May 15. Vol. 38. No. 10. pp. 123–129. With 1 chart. [75 refs.]

³⁷ LAWRENCE (Herman). The Incidence of Skin Conditions in Australia.—*Brit. Med. Jl.* 1935. Sept. 28. pp. 572–575. With 2 figs. (maps).

MISCELLANEOUS.

SALAH (M.). Studies on Anaemia in Egypt. I.—Methods of Investigation. II.—Helminthic Anaemias. III.—Treatment and Mechanism of Helminthic Anaemia. IV.—Rarity of Addisonian Anaemia in Egyptians.—*Jl. Egyptian Med. Assoc.* 1935. July. Vol. 18. No. 7. pp. 425–437. With 1 fig.; 438–454; 455–472. [24 refs.]; 473–482. With 1 fig. [19 refs.]

These lectures by Dr. Salah form an important contribution to the study of tropical anaemias and in consequence those who are interested in the subject would be well advised to read for themselves this special number of the Journal of the Egyptian Medical Association.

I. Methods of Investigation.

In his introductory remarks Dr. Salah points out that considering the low diet of the poorer classes and the gastro-intestinal pathology resulting from alimentary parasites, it is only natural that anaemia should prove a prevalent ailment in Egypt. Such anaemias may arise from three factors—blood destruction, blood loss and deficient blood formation—and for their complete elucidation investigations should include a clinical examination, a haematological investigation and a search for parasites and their ova, as well as special gastro-intestinal tests.

The clinical examination.—Apart from the history and the examination of the different systems there should be a routine inspection of the skin, sclera, mouth, nails and thyroid gland. Spoon nails, for example, are diagnostic of hypochromic anaemia, while clubbing suggests tuberculosis, chronic sepsis, etc. Glossitis is associated with both Addisonian anaemia and idiopathic hypochromic anaemia and the Plummer-Vinson syndrome: bleeding gums may result from aplastic anaemia, haemorrhagic diathesis or scurvy, while stomatitis and pharyngitis terminating in necrosis of tissue may be the only manifestation of aplastic anaemia or agranulocytosis. A pigmented line in the gums is always suggestive of lead or bismuth poisoning.

Haematological examination.—The author states that an examination of a blood film stained with Jenner's stain and a haemoglobin estimation by Sahli's method should be included as a routine measure in the examination of all patients in Egypt. If more detailed haematological studies be required, as suggested by the clinical findings, 1 cc. of blood is drawn from a vein without the application of a tourniquet and put into a dry oxalated test tube: such a sample gives quite accurate results provided the different examinations be made within half an hour of its collection. Additional examinations include the red cell and leucocyte counts, the colour index, the differential and platelet counts and, in special cases, the van den Bergh reaction, sternal puncture and the determination of the size of the red blood corpuscle; the latter can be accomplished by:—(i) measuring the diameter of the erythrocyte by direct or indirect micrometry or by the halometer; the latter method, however, has not, in the author's experience, yielded reliable results and Price-Jones curves are advocated; (ii) measuring the volume of the red cell by Haden's method. Sternal puncture is a simple technical procedure and in certain cases has afforded the only clue to diagnosis. For the actual technique the reader is referred to a previous publication.

Special Gastro-Intestinal Investigations.—These include gastric analysis using the alcohol-histamine method, the glucose tolerance test,

chemical analysis of the stools for steatorrhoea and occult blood, and sigmoidoscopy. The stools should always be examined for parasitic ova and in some infections such as *S. mansoni*, *Taenia* and *Heterophyes* repeated tests often prove to be necessary. A positive cutaneous reaction in the absence of ova suggests cured or closed bilharziasis.

II.—*Helminthic Anaemias.*

A total of 762 cases of helminthic anaemia was studied applying the methods of investigation epitomized in the preceding review. The main parasitic causes of severe anaemia were *Ancylostoma duodenale* and *Schistosoma mansoni*. Urinary schistosomiasis was a cause of moderate anaemia especially if associated with haematuria or urinary sepsis, while infection with *Heterophyes heterophyes*, *Hymenolepis nana*, *Taenia saginata* and *Filaria bancrofti* were only associated with a mild degree of anaemia or normal blood counts.

Red Blood Corpuscles.—Marked hypochromia was a constant feature of the severer cases, a haemoglobin value of from 15 to 20 per cent. being common; in two cases it was as low as 8 per cent. The number of r.b.c. was only moderately decreased so that the colour index was low; it averaged 0.6 for the series, the highest value being 0.8 and the lowest 0.4. Microcytosis was common especially in severe chronic anaemia, while in moderate cases normocytosis was usually found: the average corpuscular diameter was 6.85 microns, the highest being 7.4 and the lowest 6.1 microns. Macrocytosis was never found. The Price-Jones curve showed a shift to the left in the chronic cases and a wide base in the normocytic group. Poikilocytosis was frequent, reticulocytosis was not marked and nucleated corpuscles were confined to heavily infected ancylostome cases of short duration; when present they consisted of normoblasts and occasionally macro-normoblasts, but never megaloblasts. The presence of a high reticulocyte count suggested some complicating factor, such as haemorrhage, malaria, etc.

Leucocytes: a tendency to leucocytosis (11,000–12,000 per cmm.) was met with in acute ancylostome anaemia and in cases associated with pellagra. Chronic uncomplicated ancylostome anaemia showed a normal or slightly diminished total count, while in the anaemia of intestinal schistosomiasis there was a tendency to leucopenia especially if hepato-splenomegaly had supervened; figures as low as 1,500 cells per cmm. were encountered.

The percentage of eosinophiles depended on the stage of the disease and the constitution of the patient rather than on the intensity of infection: eosinophilia was most marked in the early stages where it reached 70 to 75 per cent. in acute ancylostome cases; it was higher in people with higher haemoglobin values. Cases showing marked eosinophilia recovered quicker on treatment, while in severe infections those with a mild eosinophilia or none at all did not do well; this is only true however, if other signs of marrow failure are present and if infective or septic conditions are absent. An eosinophilic rise affords an index to effective therapy just as reticulocytosis does to haematinic agents.

The neutrophils were generally diminished, but a regenerative shift to the left with the Schilling's haemogram was only noted in acute cases of ancylostome anaemia associated with leucocytosis.

In very chronic cases relative lymphocytosis accompanying neutropenia was sometimes found, but monocytosis always suggested malaria.

Blood Platelets.—The platelet count was slightly diminished, averaging 175,000 per cmm.

Blood Chemistry.—The icterus-index was always within normal limits, indicating an absence of haemolysis as a causative factor in the anaemia. The total protein, estimated by Howe's method, was not uncommonly reduced, but there was no increase in urea, uric acid or non-protein nitrogen. The whole-blood cholesterol was constantly decreased, such low figures as 57 mgm. per 100 cc. being found. Hypocholesterinaemia under these circumstances is attributable to loss of red cells and haemoglobin and is not characteristic of any special type of anaemia; it is more parallel to the haemoglobin reduction than to the oligocythaemia. The chloride content of the whole blood was increased in most cases, while the calcium content of the serum was variable; no relationship was found between the degree of eosinophilia and the serum calcium.

Clinical Manifestations.—Investigation showed that intestinal worms, especially ancylostomes and schistosomes, could produce disturbances of gastric secretion, only 158 out of 564 cases showing normal curves, while a return toward normal was observed after expulsion of the worms in the 92 cases studied from this viewpoint. These gastric disturbances might or might not produce symptoms. The hyperchlorhydric group sometimes gave rise to a clinical picture simulating duodenal ulcer, while the hypochlorhydric and achlorhydric group usually lead to anorexia and sometimes to gastrogenous diarrhoea. The frequency of mucus of gastric origin suggested gastritis as a basic factor underlying these disturbances.

Oedema: the occurrence of oedema in helminthic infections was not uncommon and 22 such cases were subjected to clinical and biochemical studies. All patients showing oedema were markedly anaemic, yet there was no relationship between the occurrence of oedema and the degree of anaemia. The absence of marked albuminuria, the normal blood urea, the absence of high blood pressure and the low blood cholesterol were definitely against either a nephritic or nephrotic factor being responsible for the oedema. Hypoproteinuria was found in 11 out of 15 cases, and the fact that this was the main factor in the production of the oedema was proved by its disappearance within 10 to 15 days on protein reinforcement of the dietary, and this in the absence of all other forms of treatment.

Glossitis and Stomatitis: Glossitis occurred to some degree in 12 per cent. of patients suffering from helminthic anaemia. It was more frequent in those showing acidity, but might occasionally be found associated with hyperchlorhydria. Not uncommonly it was encountered in intestinal bilharziasis.

Dysphagia: about 1 per cent. manifested painless upper oesophageal dysphagia, this feature being invariably accompanied by stomatitis. Achlorhydria was found in 4 out of 8 cases and in two of these splenomegaly occurred (Plummer-Vinson syndrome).

Koilonychia: Spoon-shaped nails were met with in 22 cases, i.e., about 2.5 per cent., and were mostly associated with ancylostomiasis; twelve were achlorhydric and 5 were hypochlorhydric. Convexity of the nails up to marked clubbing was encountered in certain cases of bilharzial dysentery.

Nervous manifestations: eighteen cases with nervous stigmata mainly due to tract lesions were observed. Of these, 14 were traceable

to associated pellagra ; in the remaining four signs of lateral sclerosis were demonstrated in two, and of subacute-combined-degeneration in the other two.

Finally, the author summarizes this important study by stating that the diagnostic points in the blood picture associated with helminthic infestation are those of a marked hypochromic, micro-normocytic, non-haemolytic, hypoplastic anaemia with eosinophilia.

III.—*Treatment and Mechanism of Helminthic Anaemia.*

Complete expulsion of parasites did not result in improvement in the anaemia of 27 patients kept in hospital upon a low protein diet : there was an increase of only 4 per cent. in haemoglobin in 3 to 4 weeks and an average gain in red cells not exceeding 500,000 per cmm. within the same period. When placed on a well balanced diet with sufficient protein the average rise of haemoglobin in 47 patients after anthelmintic treatment was 3 per cent.

Liver Therapy : three hundred grams of raw liver by the mouth for 2 to 4 weeks daily did not produce any notable increase in the haemoglobin percentage in 33 cases : there was no specific reticulocyte response and only in a few was there an increase in erythrocytes to the extent of 500,000 per cmm. Campolon injections were similarly ineffective. Eosinophilia commonly follows the administration of liver extract in megalocytic anaemia, but this was never observed in the present series. On the other hand, an eosinophile increase followed iron therapy—a finding which suggests that the eosinophilia originates from stimulation of the bone marrow rather than in an allergic state.

Iron therapy : iron in large doses elicited a prompt improvement in the blood picture, ferrous iron as Blaud's pills (3 to 4 t.d.s.) and *Ferri et ammonii citras* (1½ to 2 grams t.d.s.) proving most efficacious in the absence of complicating factors interfering with its utilization and absorption.

Iron was found to be more effective in ancylostoma anaemia than in intestinal bilharziasis owing to the more marked and persistent gastro-intestinal lesions in the former disease. MINOT and HEATH had found that the lower the initial color index the higher the reticulocyte crises in hypochromic anaemia under iron therapy. In the present study this finding was confirmed, but it was also ascertained that the reticulocyte response was greater where the initial figures for both reticulocytes and eosinophiles were higher. The reticulocyte curve following iron therapy in the presence of parasites proved lower, more delayed and flatter with occasional fluctuations, than when iron was administered after their expulsion, while in some cases it was found that a further rise in haemoglobin occurred after the infection was eradicated. These findings suggest that the mere presence of the worms interferes to a certain extent with the utilization of iron *per os*—possibly through the formation of a toxin. Other modifying actions such as defective secretion of HCl, diarrhoea, sepsis, hypothyroidism and arteriosclerosis are considered in relation to the therapeutic effectiveness of iron.

After parasites had been eliminated and iron given the haemoglobin rose to 60 to 75 per cent. but subsequently no further rise was observed during the period of observation extending over 10 to 15 days.

In helminthic anaemia injections of iron, using the British Pharmacopoeial preparation (injectio ferri), proved incapable of raising the

haemoglobin more than 10 per cent. in 3 weeks and copper and arsenic were likewise ineffective.

Preparations like marmite and vitamin C had no effect on the reticulocyte response or haemoglobin values, a finding which was expected in view of the micro-normocytic nature of the anaemia.

The mechanism of the production of helminthic anaemia was next considered and such factors as haemorrhage which might lead to loss of iron, depletion of haematopoietic hormone or exhaustion of the bone marrow were analysed, as well as the rôle of helminthic toxin, diet and gastro-intestinal factors. Though the ancylostome is a blood sucker and occult blood is readily demonstrated in the faeces of cases of ancylostomiasis, the number of worms expelled after treatment was not proportionate to the degree of anaemia. Similarly, in vesical bilharziasis where the blood loss is considerably greater than the intestinal variety, the anaemia was in point of fact less intense.

Achlorhydria was found to be commonly associated with helminthic anaemia and the author concludes that, though blood loss and possibly toxins may be contributory factors, the essential and more important mechanism is nutritional deficiency resulting from deficient diet and gastro-intestinal dysfunction. The deficiency is mainly in iron although other substances such as lecithin, protein, etc., are possibly also implicated. Treatment should be directed to supplying iron in large doses and also fats and proteins to help in the construction of the haemoglobin molecule.

IV.—Rarity of Addisonian Anaemia in Egyptians.

In a series of 1,128 hospital cases with anaemia not a single instance of Addisonian anaemia was encountered. After reviewing recent advances in knowledge concerning the production of pernicious anaemia in terms of extrinsic, intrinsic and haematopoietic factors the author considers the various conditions which may be responsible for its absence in Egypt. Race is known to exert an influence as illustrated by the low frequency of Addisonian anaemia amongst Italians, Russians, Jews and North American negroes. Again, a constitutional tendency is marked as Friedländer showed, since the disease mainly occurred in individuals with fair complexions, light hair, blue eyes and achlorhydria. A familial incidence was quite common and relatives of patients suffering from pernicious anaemia often themselves presented constitutional achylia which was a predisposing factor. Constitutional achylia was not encountered in a series of 187 healthy Egyptian children under 10 years of age, whereas acquired achylia secondary to helminthic anaemia, gastritis and pellagra frequently occurred, but never with Addisonian anaemia, a finding which suggested that an intrinsic factor must be present despite the achylia. Using Singer's method for demonstrating the intrinsic factor in gastric juice the author showed this to be the case; a positive R.R.R. reaction in white rats was obtained in 5 chronic pellagra patients and 2 cases of helminthic anaemia. Climate also might be responsible. Thus, Addisonian anaemia was known to be common in temperate zones and rare in tropical countries. Was it possible that the sun's rays by increasing skin pigmentation produced a constitutional condition unsuitable for the development of this disease?

The author concludes that racial and constitutional factors probably underlie the extreme rarity of Addisonian anaemia in Egypt.

N. Hamilton Fairley.

SALAH (M.). The Types of Splenomegaly in Egypt and their Diagnosis.
—*Jl. Egyptian Med. Assoc.* 1935. Apr. Vol. 18. No. 4. pp. 255-266.

The author's account of splenomegaly in Egypt [which is not the same as Egyptian splenomegaly] is comprehensive, but from the point of view of diagnosis in life savours rather of the academic than the practical. His classification is on pathological lines and rightly so, but, though it includes every known lesion, is too subdivided for practical purposes.

The causes as a basis for diagnosis are divided into 5 groups with subdivisions: *viz.*, I. Simple Hypertrophy. II. Lymphoid Tissue lesions, including lymphocytic leukaemia, lymphosarcoma and fibroadenia. III. Reticulo-endotheliosis, subdivided into 3 main types with several subtypes. IV. Vascular lesions: Fibro-siderosis, thrombophlebitic, congestive and angiomatous. V. Hepatolienal diseases with more than a dozen subdivisions. The last is, the author states, "the most vague and unfortunately the most common in Egypt." He divides these into two main groups, according as the spleen or liver is primarily enlarged. It rather adds to the confusion to include, for example, hydatid of liver since "this is not associated with enlarged spleen unless a similar condition affects the latter," and Gaucher's disease which has not yet been recorded in Egypt.

The endemic splenomegaly of Egypt belongs to Group V and "is primarily a liver disease of bilharzial cirrhotic (mostly hypertrophic) nature, the splenic enlargement is one of its frequent manifestations." Analysis of 500 cases has led the author to the following conclusions: "(1) In no case of Egyptian splenomegaly confirmed . . . was the liver free from disease." (2) "Many more case of bilharzial liver disease are met with without enlarged spleens." (3) In every case of splenomegaly without evidence of liver implications a cause for this condition other than bilharziasis could be elicited. H. H. S.

MENON (T. Bhaskara) & ANNAMALAI (D. R.). The Incidence of Hepatic Cirrhosis in South India.—*Indian Jl. Med. Res.* 1935. Apr. Vol. 22. No. 4. pp. 827-835. [10 refs.]

The authors analyse mortality returns and hospital admissions in Madras and show that the incidence of hepatic cirrhosis is much higher than in Europe, that it has no special association with alcoholism and that the portal type is the most common. They suggest that there is a special association between portal cirrhosis and bacillary dysentery.

Figures are quoted to show that the incidence of hepatic cirrhosis is high in Bengal (ROGERS, this *Bulletin*, 1925, Vol. 22, pp. 957-61) and in Java (SNIJDERS, *l.c.*, 1934, Vol. 31, p. 330). The authors have analysed the Annual Report of the Health Officer of the Corporation of Madras, the hospital admission register and post-mortem figures. A table gives the annual figures of the Report as regards cirrhosis for 1923-1932 and shows that the average mortality per 100,000 in that period was 32.6, whereas that of England and Wales in a similar series of years was 4.7, showing that judging from mortality figures this disease is 7 times as common in Madras.

The register of admissions to the Government Rayapuram Hospital, Madras, shows 183 cases of cirrhosis in the last 3 years out of 30,817.

All but 6 were of the portal type. Of the 177, 92 per cent. were in Hindus, but 77 per cent. of the total admissions were of this race.

A study of the sex distribution shows that only 43 were in women. The greatest frequency is between 30 and 50 years.

From autopsy figures for Madras we get 4.39 per cent. cirrhosis in 1,115 autopsies, a slightly lower figure than that of ROGERS for Bengal.

As to causation there is no special relation to alcoholism.

"One of us (B.M.) carried out an analysis of autopsy records in the Madras Medical College, while working in the pathology department in 1928. The results, which are now published for the first time, show that out of 119 cases of portal cirrhosis, 45 showed definite inflammatory lesions in the large intestine. These lesions could be classified into old pigmented scars, small haemorrhagic ulcers, superficial ulceration with extensive congestion, extensive superficial ulceration involving large tracts of mucosa, large deep ulcers with necrotic base, etc. . . . Out of these 119 cases, the intestines were not examined in three cases, so that the percentage works out as 38.87 of hepatic cirrhosis, showing dysenteric lesions. Out of these 45 cases showing dysenteric lesions, in 32 cases the lesions resembled those met with in acute and subacute bacillary dysentery. They were either superficial ulcers with extreme congestion, capillary haemorrhages or small follicular ulcers surrounded by zones of congestion or extensive superficial ulceration involving large tracts of mucosa. The remaining 13 cases showed frank amoebic ulceration or healed pigmented scars. A comparison of these figures with the proportion of dysenteric lesions, met with in hospital autopsies in general, is of interest. Out of 368 recent autopsies in the Government Rayapuram Hospital, Madras, dysenteric lesions were found in 59 cases or 16.30 per cent. It seems, therefore, that there is some evidence for a positive association between dysenteric lesions in the intestines and portal cirrhosis."

Three cases of capsular cirrhosis were associated with malaria.

A. G. Bagshawe.

McGUIRE (Christie). **Ulcers in the Tea-Gardens.**—16 pp. With 15 plates. [12 refs.] 1934. Calcutta. Published by the Indian Tea Association.

The object of this research into the aetiology and treatment of ulcers in tea-gardens was to introduce a standard treatment. The author has been 9 years at the study, first at the Calcutta School of Tropical Medicine and then in the Doars.

He classifies the ulcers thus :—

- "1. *Tropical Phagedaenic Ulcer*, due to the fusiform bacillus of Plaut.
- "2. *Actinomycotic ulcers*, due to *actinomyces keratolytica* (Acton and McGuire) which I shall describe under the heading of Actinomycosis Cutis [see this *Bulletin*, 1930, Vol. 27, p. 523; 1932, Vol. 29, p. 273].
- "3. *Hookworm ulcers*, due to the entrance of hookworm larvae into the skin, a condition first reported by Bentley (1902).
- "4. *Streptococcal and staphylococcal ulcers* producing the lesions Impetigo and Ecthyma."

Tropical phagedaenic ulcer.—ACTON and PANJA showed that this ulcer "is caused by the fusiform bacillus," the spirochaete being a secondary invader. The author has found this bacillus in the 2,000 cases he has examined; they form a dense felted layer beneath the slough, which secures the needful anaerobiosis. In treatment the

slough must be removed and for this a soluble caustic is needed. The best is copper sulphate. His formula is :—

" R/Copper sulphate	...	3 drachms
Acid carbolic	...	1 drachm
Distilled water	...	1 ounce."

" The copper sulphate must first be powdered in a mortar and thoroughly mixed with the distilled water until every bit of the copper sulphate has gone into solution. There must be no deposit. The carbolic acid is then added. As the carbolic acid rises to the top of the solution when it is left standing, it must be shaken before use on each case so as to mix the carbolic with the copper sulphate. This is very necessary as the solution is then rendered practically painless and the ulcer can now be swabbed thoroughly."

The ulcer is swabbed twice daily with the solution and as much slough as possible removed. A powder of iodoform 1 part and bismuth subgallate 3 parts is then dusted over the ulcer which is covered with a piece of dry lint and bandaged. If iodoform causes a skin eruption calomel is substituted and bismuth subnitrate may be used in the place of the subgallate. This treatment leads to cure in about 14 days, and the labourer can resume work after 7. He finds that trauma followed by impetigo plays an important part in the spread of these ulcers and advises the application of Ung. Hydrarg. Ammon. (gr.x to 3i) to any cut or abrasion. The infective organism is almost certainly spread by the fly, *Siphonella funicola*.

Actinomyces cutis.—This condition described by ACTON and the author is limited to the skin and does not invade the deeper tissues nor produce granules. It corresponds to *Ulcus interdigitale* and *Keratoma plantare sulcatum* of CASTELLANI and the lesions are usually found between the toes and on the soles. They are known in the tea gardens as pani-ghao (water sore).

Actinomyces cutis interdigitalis occurs with the first onset of the rains and is seen in Ceylon and the Philippines as well as India. The causative agent *Actinomyces keratolytica* can only be seen by a special technique of staining which is described. The colouring agent is Toluidin blue which stains mycelia without staining keratin. The ulcer produced is very painful. The treatment, which is almost specific, consists in painting the lesions with a 2 per cent. solution of gentian violet in distilled water. Crowds flock round the dispensary clamouring for this treatment.

Actinomyces cutis plantaris is a pitted condition of the heel and tread of the foot. It is very painful and is caused by the same fungus. The treatment, which again is specific, consists in painting 20 per cent. formalin on the soles once a day.

Hookworm ulcers.—These also are known as pani-ghao. The author says that one can see linear track marks showing the entrance of hookworm larvae. The labourers do not come for treatment till the vesicles have become infected. The vesicles are usually seen on the sides of the feet and instep. In the early stage application of 2 per cent. gentian violet is effective. If an inflammatory condition or ulcers are present lint soaked in acriflavine applied 3 times daily is advised.

Impetigo and ecthyma.—For these conditions, which are prevalent among the European staff the author advises Ung. hydrarg. ammon. in uncomplicated cases and acriflavine lotion when the lesions are eczematous.

A. G. B.

HOUSIAU (F.) & DU SOLEIL (G.). Des plaies infectées chez les noirs aux mines de Kilo. Du phagédénisme vrai et faux. [**True and False Phagedaenic Ulcer in the Black Miners of Kilo.**—*Ann. Soc. Belge de Méd. Trop.* 1935. Mar. 31. Vol. 15. No. 1. pp. 85–98. With 11 figs.]

The true phagedaenic or tropical ulcer is regarded as an ulcer due to the association of the fusiform bacillus with the spirillum of Vincent. In the region of Kilo, however, this association was rather rare and the ulcers, even of phagedaenic type, contained a very varied microbial flora, in which the fuso-spirillar association was absent. Such ulcers have then to be designated "false" phagedaenic ulcers. Staphylococci predominate among the organisms found and streptococci are rare. No anaerobic cultivation was done and nothing can therefore be said of anaerobes. In the view of the authors the "true" phagedaenic ulcer is secondary to an infection produced by other organisms. They have used a number of different vaccines in the treatment of the ulcers and have come finally to one composed of 24 strains of isolated organisms plus fuso-spirillar ulcer material. This has been treated with iodine and with formol and the mixture is regarded as containing "anatoxin." The results have been decidedly successful and the time to healing much reduced; only a few ulcers have failed to clear up under the treatment. The importance of saving of unemployed time for a worker in the mines is very evident.

W. F. Harvey.

i. DE LANGEN (C. D.). **Clinical Arteriosclerosis in Java.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1935. Vol. 24. No. 1. pp. 1–8.

ii. MÜLLER (H.) & FOSSEN (A.). Die Altersveränderungen der Arterien bei Malaien und auf Java lebenden Chinesen.—*Ibid.* pp. 9–26. With 7 figs. on 2 plates. [20 refs.]

i. The author gives the following "conclusions and deductions":—

"1. Arteriosclerotic vascular changes are at least as common in Java as in Europe. If the relative age-grouping of the patients is taken into consideration, the impression is gained that these vascular changes are even more common here.

"2. Amongst the Javanese people of lower class the clinical picture of angina pectoris is not met with, but it is seen much more often amongst those of better standing. The same is observed amongst the Chinese patients but not quite so clearly. And yet sclerotic changes in the coronary vessels are very common in our native hospital patients.

"3. The occurrence of hypertension as a clinical picture parallels angina pectoris. Here, too, is found the paradox of much arteriosclerotic and but little hypertension among the great masses of the people, a relationship which changes with natives of better standing.

"4. Hemiplegia is very common here, but syphilis is the predominating cause.

"5. Thrombosis and emboli practically never occur.

"6. Thrombo-angiitis obliterans is regularly met with in the Netherlands Indies."

These conclusions may be supplemented. The author draws attention to the difficulties of the investigation: *e.g.*, persons with severe vascular changes may have no symptoms and therefore not come under observation. The average age of the patients was much lower than that in European hospitals; and the number of old persons small. Of patients seen in the author's department 88 per cent. were between 15 and 45, 9 per cent. between 45 and 65 and only 3 per cent. above 65.

Under the heading, general sclerotic changes in the vessels, the author notes in the younger age-groups that the radial, brachial or femoral arteries were frequently markedly tortuous, not having hard or tense walls but being soft and relaxed, and the blood pressure low rather than high. Under sclerosis of the coronary vessels he notes that whereas in 5 years' hospital practice only one native patient was treated in the wards, in his own practice (regents, native doctors, etc.) there were 12 cases of angina pectoris. He discusses the reason of the rarity of thrombosis and embolism in Javans, and is inclined to attribute it to the vegetarian diet and a lowered irritability of the vegetative nervous system. The current belief that diet, and especially the lipoid and cholesterin content, is responsible for arteriosclerosis which consequently spares the natives he contests; he rather inclines to the view that a diet poor in fats may lead to nutritional disturbances in the vessel walls and a loss of normal elasticity.

Lastly he reports data collected by Dr. KOUWENAAR in Medan. Careful observations were made of the sclerotic changes in the vascular system of 41 autopsied subjects, 22 Javanese and 19 Chinese. Only 5 had no sclerotic changes, and in 8 instances they are described as severe. The majority of the lesions were found in the aorta, and the coronary vessels came second.

ii. The authors give the following summary—:

"A survey has been made on the changes of the arteries in ageing of one hundred and two Javanese and sixty-three Chinese, ranging from birth up to the age of seventy, taking into consideration the modifications of the inner and medium layers of the arteries, the appearance of the so-called chromotropic or mucoid substance and the features usually ascribed to arteriosclerosis. No difference can be found between Europeans living in Europe and America, and the above mentioned races. Accurate statistics about the occurrence of the different alterations of the arteries cannot be given, because we have no knowledge of the exact age of the inhabitants of this country."

A. G. B.

DELANOË (E.) *Maladie de Buerger chez une femme arabe. Essai d'interprétation de la pathogénie de cette maladie, son traitement.* [**Buerger's Disease in an Arab Woman. Its Pathology and Treatment.**—*Bull. Soc. Path. Exot.* 1935. June 12. Vol. 28. No. 6. pp. 460-464.]

Buerger's disease, or thrombo-angiitis obliterans, is said to affect male Jews. The patient in this instance was a female Arab. After treatment, which is described, she recovered.

A. G. B.

SCOTT (H. Harold). **Tuberculosis in Man in the Tropics.**—*Proc. Roy. Soc. Med.* 1935. Aug. Vol. 28. No. 10. pp. 1343-1351 (Sect. Trop. Dis. & Parasit. pp. 61-69). [Summary appears also in *Bulletin of Hygiene.*]

In discussing this subject the author draws upon his experience of making post-mortem examinations on man in the West Indies and in Hong Kong, and on animals at the London Zoological Gardens. Three types of tuberculosis are recognized, *viz.*, (1) natural, occurring in completely unprotected adults, in infants and very young children and in other primates, (2) a chronic "modified" found in races long exposed to infection, and (3) an intermediate or "larval" form.

The author next considers the two main portals of entry, *i.e.*, primary intestinal and primary lung involvement, citing autopsy records as

examples. In the case of the primary intestinal infection bacilli pass to the mesenteric glands, then spread either by (a) the inferior vena cava to the right side of the heart and so to the lungs, or (b) through lumbar and inguinal glands to the falciform ligament. In the case of primary lung infection bacilli may pass (a) to mediastinal glands, pulmonary circulation by way of veins, generalization again in the lungs, thence to systemic circulation to lodge in spleen, liver and kidneys, or (b) by swallowed sputum to intestine, thence to mesenteric glands and by direct continuity to lumbar and inguinal glands and thence to falciform ligament. Difficulties arise, however, in the case of New World monkeys owing to the fact that they have no thoracic duct.

A summary is given of previous work by Professor BEATTIE and the author showing that two distinct forms of acute tuberculosis are to be found both in man and in other primates, *viz.*, [a] a respiratory type with a rapidly fatal infection causing death by general dissemination of bacilli by the lymphatics and the blood vessels, and [b] a primary alimentary form, less rapidly fatal. Alimentary tuberculosis may also be secondary to primary respiratory infection, the disease being transmitted to the intestines by the swallowing of large numbers of bacilli. In each type of disease the dissemination of infection to the lymphatic system takes place in the same order in monkeys as in man, and the proportion of alimentary tuberculosis to respiratory is probably much the same in all primates. Respiratory tuberculosis is identical in young human subjects and in other primates but in later life in the former a modifying factor comes into play. Tuberculosis in early human life is the "natural" form of the disease. In other primates the modifying factor is absent and the adults are affected in the same way as the young animals.

The author considers that the only congenital infection with *Mycobacterium tuberculosis* is by way of a tuberculous placenta. He cites a case related elsewhere of a baby 22 days old dying with a caseated focus in one lung, another 24 days old with a caseous focus in one lung and grey tubercles disseminated through both, and a third, aged 7 weeks, with extensive involvement of both lungs. SCHLUSTER is also cited as having collected 12 cases of tuberculosis at birth.

An analysis of the sex distribution of 300 cases of tuberculosis in natives (Hong Kong) gives 155 males and 145 females, but the preponderance was entirely in those over 20 years of age. Up to 10 years males were to females as 4 to 5, between 10 and 20 years they were equal, and over 20 years the ratio was 3.6 to 1. In China, at least, this does not imply that the incidence is necessarily so much higher in males, the preponderance of males being probably due to the fact that females more readily go home to die and are unrecorded.

Comparing his autopsy figures on the Chinese children with those of Canti, Ghon, Albrecht and others on European children, the author points out that the presence of tuberculous mediastinal glands is not invariably an indication of a pulmonary focus. Amongst 225 autopsies on children detailed in his previously published report it did not hold good in 13 per cent., *i.e.*, caseous tracheo-bronchial glands were present but no focus was discovered in the lungs. Furthermore, it is not invariably true that tuberculous mediastinal glands when present bear a close relation to the focus in the lung. Again, when a focus was present in the lung, tuberculous mediastinal glands were not constantly found. In the author's experience fibroid or healed foci were rarely seen in children. Instances of peculiar and unexplainable association of sites

of lesion are also cited. Thus, 12 instances were met with of limitation of the disease to the lung and to the meninges. In another case there were two mediastinal glands infected but no other lesion, but miliary tubercles were present in the meninges. Lastly, a case is cited of abdominal tuberculosis with tubercles in the meninges and no other lesions. In these 300 Hong Kong cases there was a much greater preponderance of tuberculous meningitis amongst adults than amongst children—1 out of every 5 adults with chronic pulmonary tuberculosis showed miliary tubercles in the meninges without signs in the other viscera. Finally, no cases of haemoptysis were recorded in the group of 225 children.

Discussing the severity of pulmonary tuberculosis amongst natives in the tropics the author does not think that virgin soil will explain the prevalence. Mode of life, habits or change of habits, industrialization, overcrowding, general bad sanitation, early marriage, frequent pregnancies, prolonged lactation, poor food, want of exercise and all the rest, must be taken into account. Dealing with the introduction of the tubercle bacillus into native countries by infected Europeans, the author concludes that "every consumptive person expectorating the tubercle bacillus is to be regarded as a public menace and, to the negro, a very real menace. Tropical conditions are not always good for the phthisical European. He can, it is true, be more in the open air, but the tuberculous subject is easily fatigued; he avoids the tropical sun, his rooms are shaded to keep them cool, he suffers from loss of sleep, his appetite is capricious and his food less nutritious than at home. Even were it not so, is it not, to put it very mildly, a little selfish to introduce open tuberculous cases among unprotected or even partly protected natives?"

S. Roodhouse Gloyne.

PFLOMM (Erich). Operationsvorbereitungen in den Subtropen. [**Pre-Operation Precautionary Measures in Subtropical Regions.**]—*Muench. Med. Woch.* 1935. Apr. 25. Vol. 82. No. 17. pp. 661-662.

The region in question is South China. Here the natives stand operations, particularly abdominal operations, badly; the chief conditions to bear in mind are syphilis, beriberi and clonorchiasis.

Beriberi is widely distributed and in its early stages may give little evidence of its presence. In the last two years the author has administered to every operation patient whether there was suspicion of beriberi or not, large doses of cardiazol, thus eliminating beriberi shock. In cases in which immediate operation was necessary cardiazol was injected once or more in the course of it.

In Kwangtung clonorchis infection is found in 16 to 100 per cent. of people, according to district, in seamen and fishermen in 49 and 100 per cent. respectively. The eggs must be looked for in the stools in every case. Many fatal results especially in abdominal operations must be put down to this worm. Treatment is by spirozid or neosalvarsan; latterly, following on the work of OTTO, gold injections have been used, and among these the author prefers solganol B oleosum, every 4-5 days in increasing doses. If there is not time for preliminary treatment liver preparations, such as campolon and hepatrat, are injected to reinforce the disturbed liver function.

A. G. B.

REVIEWS AND NOTICES.

BLACKLOCK (D. B.) [M.D. (Edin.), D.P.H. (London), D.T.M. (Liver.)]
& SOUTHWELL (T.) [D.Sc., Ph.D., A.R.C.Sc., F.Z.S., F.R.S.E.].
A Guide to Human Parasitology for Medical Practitioners. Second
Edition.—pp. viii + 259. With 2 coloured plates & 122 text
figs. 1935. London: H. K. Lewis & Co., Ltd. [12s. 6d.]

When reviewing for this *Bulletin* the first edition of Blacklock and Southwell's little book, the writer expressed the opinion that it represented "a successful attempt to meet what he has long recognized as a very urgent need—a small concise text-book suitable for students commencing a study of Parasitology, and particularly for those who are taking the course of instruction prescribed for the Diplomas of Tropical Medicine and Public Health." The fact that the first edition has been exhausted so quickly is a very satisfactory demonstration that teachers and students have agreed with the reviewer.

As the original edition was so excellent, it is not surprising that the new one contains but few changes. In their introduction the authors state that in revising the book they have taken advantage of the critical suggestions which have appeared in various reviews of the first edition, and that they have now omitted some matter not essential and some which proved incapable of adequate treatment in an elementary book of this nature. This has resulted in the deletion of the matter relating to *Dipylidium* and of the half dozen pages devoted to drugs used in the treatment of parasitic diseases. A number of clerical and minor errors which had crept into the earlier edition have been rectified and the index has been improved.

Two features of the new edition appear to the reviewer to be so unusual as to merit particular notice and special commendation. The authors have not merely successfully resisted the almost overriding temptation to increase the size of the volume, they have actually succeeded in reducing it by twelve pages; and the publishers while maintaining the same high standard of printing and finish have managed to reduce the price from 15s. to 12s. These facts suggest that the authors and publishers are determined to produce eventually something which will surely be unique, *viz.* a wholly satisfactory elementary text-book at a price which even the impecunious student will regard with favour. They have our best wishes in their pursuit of this unattainable ideal.

W. Yorke.

Manson's Tropical Diseases. A Manual of the Diseases of Warm Climates.—Edited by Philip H. MANSON-BAHR, D.S.O., M.A., M.D., D.T.M. & H. Cantab., F.R.C.P. Lond., Physician to the Hospital for Tropical Diseases, London, etc. Tenth Edition. Revised.—pp. xx + 1003. With 22 colour plates, 15 half-tone plates, 381 figures in the text, 6 maps & 38 charts. 1935. London, Toronto, Melbourne & Sydney: Cassell & Co., Ltd. [31s. 6d.]

A new edition of so widely-known a manual as *Manson* is best reviewed by making some comparison of the new issue with its immediate predecessor. In spite of the enormous mass of new matter which the Editor has had to cope with, the bulk of the volume is but little increased, space for the records of the notable advances

in knowledge having been provided by sacrificing some of the less practical material in the domain of medical zoology, but even then sufficient is left to make the section most helpful for reference or for rapid revision. In the Editor's remodelled classification of disease, a new group appears—Diseases caused by Filterable Viruses. This comprises Yellow Fever, Rift Valley Fever, Psittacosis, Rabies, Dengue, Phlebotomus Fever, and the Pock Diseases, and is prefaced by an admirable preliminary discussion on the nature and characters of the infective viruses; while the material in the body of the section is presented in a clear and balanced fashion that testifies to the burden of toil incurred in tracing and collating a multitude of writings on every aspect of the virus diseases. The enquiring reader will turn with curiosity to the chapter on the typhus group of fevers. This difficult and complex family, which is subjected to the continual flux and stress of shifting opinion, is handled with clarity and common sense, and the Editor, like Sir Walter's Davie Deans in matters ecclesiastical, is scrupulous in avoiding right-hand snares and extremes, and left-hand way-slidings.

Everywhere throughout the book there is evidence of diligence and care in bringing the subject matter up to date, and another feature which requires special mention is the expanded account of methods of treatment wherever medicaments of specific value are available. Like the foregoing edition, the tenth is liberally illustrated by plates, text-figures, maps and charts; a goodly number of the coloured plates are from the Editor's hand and show that he is as ready with the brush as with the pen.

The reviewer noticed only a single *lapsus calami*—and that one which involves himself. He is quoted (p. 251) as employing the masculine form of a Latin adjective with a noun which is feminine in gender! But even this most unkindest cut does not affect his opinion that the new edition of *Manson* is a worthy representative of the high traditions of its long line.

W. P. MacArthur.

DE LANGEN (C. D.) [Professor of Medicine in the Medical School of the University in Batavia, Java] & LICHTENSTEIN (A.) [Formerly Lecturer in the Military Course in Tropical Diseases in Batavia, at Present Established in Amsterdam]. **A Clinical Text-Book of Tropical Medicine.** Done into English by Dr. A. H. HAMILTON, B.A. (Cantab.); M.D. (Penn.); L.M.B.D. First English Edition from the Revised Third Dutch Edition.—pp. 557+xxxv. With 39 plates & 12 figs. 1936. Batavia-C-Surabaya—Amsterdam: G. Kolff & Co. [27s.]

By those who are able to read Dutch this book has been spoken of as "one of the best, perhaps the best" of text-books on Diseases of Warm Climates. Now English readers have the opportunity of testing and confirming, modifying or reversing that verdict. As with all works covering a wide field, there must be inequality in the thoroughness with which the different aspects are treated, for no two authors can be expected to be fully cognizant of the most recent developments in multifarious conditions comprised under tropical medicine.

On the whole it is a very good book, but in saying this we must bear in mind that it purports to be a *clinical* text-book; it does not cover—it does not profess to cover—the larger expanse of ground such as is

included in, say, Manson's Tropical Diseases. Incidentally, it is curious to note that the most recent edition of the latter bears date 1935, and appeared in November, whereas the third Dutch edition of de Langen and Lichtenstein is dated January 1933, the introduction to the English translation dated 1934, the book appeared in November 1935, but is dated 1936.

The work begins with a graphic opening description of malaria, the discovery of the parasite and proof of its being the aetiological factor. In half a page the reader is put in possession of the important facts and the parts played respectively by MANSON, by ROSS, by GRASSI and by MACCALLUM. In some points the information is well up-to-date, unexpectedly so when we remember what time often elapses between the reception of the manuscript by the printer and the issue of the completed book. Thus we find the mention of the Schüffner dots in quartan malaria and a description of the clinical symptoms associated with infection by *Plasmodium ovale*. On the other hand there are omissions which cannot be ascribed to the translation being from a work appearing less than three years ago. For example, the account of *Chagas's disease* is poor; the *Triatoma* is the only vector mentioned and the goitrous condition associated is taken for granted as aetiological connected with the infection. Under *Leishmaniasis* no mention is made of all the work of ADLER. As regards Yaws the authors are, apparently, dualists, but, though there is a passing reference to yaws and syphilis (p. 113) there is no discussion of a vexed point. Perhaps the authors did not consider this necessary in a "clinical" work. MEGAW's grouping of tropical typhus is adopted, but nothing is said of the relative importance of the two types of Malayan typhus, the "bush" and "shop" types. Under *yellow fever*, monkey infection is noted, but no reference to mice and the importance of the protection test in mice, nor a single word regarding FINDLAY's work on this and on immunity (though HINDLE's vaccine has a line). Six species of mosquitoes, in addition to *Aedes aegypti*, it is said "may also transmit the infection to a greater or less extent," but there is nothing to indicate that infection of these is experimental in the laboratory and is not proved to occur in nature. A good general account is given of *Leprosy*, but nothing on the leprous reaction and its treatment—a clinical matter of some importance. "Climatological buboes" are transiently referred to under *plague*, but no reference has been found to lymphogranuloma inguinale and climatic bubo. Is it quite correct now to say *Br. abortus* and *Br. melitensis* "cannot be differentiated in the laboratory . . . either by cultural, serological or animal tests"? Too little is made of the importance of typhoid carriers in the tropics; their danger cannot be lightly dismissed in the words "Such an investigation is of but little practical significance because in any event there will constantly be new infections coming in from the native villages." Among the bacillary dysenteries the Sonne form is not mentioned; phage is spoken of under dysentery but nothing is said of it under plague, in which its use is even more *sub judice*, and d'HERELLE is given all the credit of bacteriophage introduction, TWORT is not even referred to. The importance of *Monilia* in *sprue* aetiology is overrated in accordance with modern views, but the points against it being causative are not considered. Further, in a clinical text-book one would expect at least a reference to FAIRLEY's researches and the results of his treatment based thereon. *Pellagra* is considered, but not the many "pellagroid" conditions.

The Helminthological sections are very unequal. Clayton LANE has not even the honour of mention in that of hookworm infestation. The following seems a little puzzling: "Blood is always absent [from the faeces] both macroscopically and microscopically; its presence indicates a complicating dysentery. In the very severe stages mild haemorrhages may take place from the gut." Two pages later: "That chronic loss of blood from the intestinal tract occurs is certain." Onchocercosis is dismissed in 10 lines, and no mention is made of ocular symptoms; Dracunculus has 3 lines, Sparganosis almost a page.

Sunstroke is dealt with in 12 lines, and heatstroke is ignored; poisonous snakes have a page, and poisonous fish a few lines more, lead poisoning practically the same. Vegetal poisons are not considered, with one exception, jenkol (*Pithecolobium geminum*).

The Index needs revision, Christophers is spelt with two 'f's, Christopherson is mentioned in the text but not in the index, Fairley becomes an adverb and Shute is spelt Shule both in text and index, but to the general reader these are negligible points so long as their views are correctly rendered.

It would not be fair to end on a carping note. Some of the chapters have been already issued as *separate* and have received special abstracts, e.g., PALTHE's on Psychiatry and Neurology in the Tropics; Vos's article on Skin Cancer in Natives of the Netherlands East Indies which has been incorporated in the Cancer section [see *Bulletin of Hygiene*, 1935, Vol. 10, p. 387]; the chapter on Geographical Pathology [*ante*, p. 71] and the tables of analyses of Foodstuffs. Other points to which favourable attention may be specially drawn are: the table differentiating malarial and quinine amblyopia (p. 28); the graphic representation of the developmental stages of Strongyloides; the coloured plate demonstrating a mode of estimating the beriberi preventing power of different forms of rice; there is a good summary of Acclimatisation.

In conclusion the printing is good, clear and well-spaced, the illustrations apposite and the coloured plates exceptionally well reproduced and the work will doubtless find a much wider public now that it has been translated, for the translating has been so well done that the English reader will rarely suspect that the work was not originally written in that language. H. H. S.

PERLA (David) [M.D.] & MARMORSTON (Jessie) [M.D.]. **The Spleen and Resistance.** With a Foreword by David MARINE, M.D.—pp. xi + 170. 1935. London: Baillière, Tindall & Cox, 8 Henrietta Street, Covent Garden, W.C. 2. [9s.]

The study opens with a brief account of the comparative anatomy and histology of the spleen. Its development is noted, and the current nomenclature of its principal cells.

After summarizing the histological changes which occur in acute infections, descriptions, largely taken from the literature, follow of appearances encountered over a wide range of bacterial, virus and other infections.

The spleen is next considered as an organ of macrophage tissue. Its importance in the mechanism of resistance is inferred from a

review of the abundant evidence of the phagocytic capacity of macrophage cells for all types of particulate matter, and also from their behaviour towards sensitized particles.

In reviewing the literature bearing on the spleen's function in antibody formation, the authors note the definite evidence of fixation of antigen by the spleen, and that in most cases splenectomy has been found to depress antibody formation.

On the question of the spleen as a site of antibody formation, the relative concentrations of antibody in various organs is discussed in some detail, although little note seems to have been taken of reports on splenic tissue culture experiments.

The second half of the study is concerned to a greater extent with observations based on the authors' researches. Splenectomy in certain animal species is shown to depress natural resistance to both acute and chronic infections. Several conditions are cited to show that experimental splenectomy may be followed by a breakdown of an acquired resistance with consequent lighting up of a latent infection. Compensating changes following splenectomy are described in the common experimental animals, and remarks are made on such evidence as is available in corresponding human pathology.

Evidence from experimental splenic transplants in rats suggests that the mechanism of resistance to anaemia of *Bartonella muris* infection depends on the presence of splenic red pulp; *i.e.*, on free and fixed reticular cells. Absence of nerve supply to such transplants is noted.

The authors describe the preparation of an ether extract of ox spleen with which they had some success in protecting splenectomized rats from the anaemia of *Bartonella muris* infection. The metabolism of copper is discussed and the spleen suggested as of importance in this connexion rather than in the metabolism of iron, as previously accepted.

A chapter is devoted to some of the reasons for the wide discrepancies in existing experimental records, such as variation in relative size of the spleen in different species, variations in amount of extra-splenic "splenoid" tissue, differences associated with the age and sex of experimental animals.

References are copious throughout the book—witness the bibliography of more than 450 entries. Subject and author indexes complete an extensive study.

P. H. Martin.

SENEVET (G.) [Professeur à la Faculté de Médecine d'Alger, Chef de Laboratoire à l'Institut Pasteur d'Algérie]. **Les anophèles de la France et de ses colonies. 1re partie. France, Corse, Afrique, Madagascar, La Réunion. Encyclopédie Entomologique. Série A, XIX.** [Anopheles of France and the French Colonies, Part I.] —361 pp. With 146 figs. & 35 plates. 1935. Paris VIe: Paul Lechevalier, Editeur, 12, rue de Tournon. [95 francs.]

The book is designed to give precise information about the *Anopheles* which occur in France and her overseas possessions, and should be of great value to the members of French Colonial Medical Services. It is planned to appear in several volumes.

The first volume, which is the subject of the present review, opens with a short account of methods of collecting and breeding *Anopheles*; this is followed by a few pages on the external anatomy designed to assist the man who wishes to identify specimens. The author

then passes to an account of the species known or likely to be discovered in France, Corsica, the French possessions in Africa, Madagascar and Réunion. The area under consideration is therefore heterogeneous, the majority of the species of *Anopheles* having African affinities, but a considerable proportion of them being members of the Palaearctic fauna. The bulk of the work deals with the species in alphabetical order, which is perhaps to be regretted because the African and Palaearctic forms are mixed with one another; moreover, closely related species such as the members of the *marshalli* group are widely separated in the alphabetical sequence. The treatment of each species is full and apparently up-to-date. The author sets out the anatomical characters of the adult and of the early stages; the geographical distribution, showing the actual localities from which specimens have been recorded in a series of maps which are not very perfectly reproduced; the breeding places and habits of the adult; and the importance of the species as a transmitter of malaria.

To the British reader the book will be valuable partly because it gives an up-to-date *résumé* of what is known, and because the author has so carefully collected available information about the distinctive characteristics in the early stages. The local lists which may be found at the end of the volume are also of great value, for they tell one immediately whether a certain species of *Anopheles* has been recorded from Madagascar, the Ivory Coast or some other French possession: names of species likely to occur in the particular area are added.

We anticipate that the book will be almost as much appreciated in British possessions as in French. P. A. Buxton.

ROCKEFELLER FOUNDATION. **Annual Report 1934** [MASON (Max), President].—pp. xiv + 408. With 17 figs. (1 map) on 11 plates. New York: 49 West 49th Street.

Although the President of the Rockefeller Foundation refers, in the preface to the Annual Report for 1934, to the difficulty in deciding upon the allotment of funds "when increased opportunity and need coincide with diminished resources," there seems to have been little or no diminution during the year in the amount of work carried on with the help, and under the auspices, of the Foundation. As in former years, there was active research in the field on yellow fever, malaria, hookworm disease, undulant fever, yaws, tuberculosis, diphtheria and other diseases. Much help was given to promote the training of men and women in public health work, and a large number of fellowships were granted. The branch of medicine specially selected for support was that dealing with derangements and diseases of the nervous system; and considerable financial aid was given for the endowment, or establishment, of special departments in existing institutions, for research in mental diseases.

In that part of the report referring to the International Health Division, many matters of interest are recorded. Considerable progress has been made in the study of the epidemiology of yellow fever, and the tests for acquired immunity to the disease have confirmed the opinion, expressed in the report for 1933, that a mild form is widely prevalent among both white and black races. The recognition of what is called "Jungle Yellow Fever" is of great importance. Four outbreaks of yellow fever occurred in Brazil, Bolivia and Colombia, in none of which *Stegomyia* (*Aedes aegypti*) mosquitoes were found,

In April 1934, "an unusually rapid and fatal form" was present not far from Cuyaba, the Capital of Matto Grosso, Brazil, in an area where *Stegomyia* does not occur: so far, the carrier in these epidemics has not been identified. The fact of the absence of the mosquito in these cases does not, of course, lessen the importance of *Stegomyia* as the vector of yellow fever in urban and other districts, but it certainly indicates that the problem of yellow fever requires further study.

The control of malaria in Italy is dealt with at some length. The introduction of the small fish, *Gambusia*, led to very successful results; in one small area in Istria, where the only antimalarial measure employed was stocking with this fish, malaria has practically disappeared. In some other districts good results were obtained by the treatment of mosquito breeding sites with Paris Green.

In the field of Natural Science, the Foundation, in accordance with its general policy of concentration on fewer subjects, selected that of experimental biology. Space does not allow even for the bare enumeration of all the subjects of medical interest, to the furtherance of which help was given; among them were heredity and genetics, endocrinology, and the physiology of respiration and reproduction.

A map of Europe (excluding Soviet Russia) is given in the report, showing the places where the Foundation is engaged, or is giving assistance, in public health work; practically every country in the continent is included.

As in former years, this Report is a record of excellent work well planned and well carried out. It shows how much good can be done when knowledge and the means to utilize it are combined with sympathetic and able administration.

H. J. Walton.

ROCKEFELLER FOUNDATION. **International Health Division. Annual Report 1934.**—235 pp. With 22 figs. on 12 plates. New York: 49 West 49th Street.

The benefactions of the Rockefeller Foundation are so many, so great and so varied that no review can do them justice. In the Foundation's Annual Report about 60 pages are given to an account of the work of the International Health Division; the separate report concerning the activities of this Division is a book of over 200 pages and even in it little actual detail is included. In the following brief review some of these activities are indicated.

Until the beginning of the present century *yellow fever* was a constant source of dread in the west, and a grave menace, especially in seaports and to shipping. Since that time, owing to work in great part instigated, inspired and financed by the Foundation, so much has been accomplished that yellow fever no longer occupies the chief place in the minds of health officers of American continents. Details are given of the campaigns against this infection in Havana, Panama, Rio de Janeiro, Guayaquil and elsewhere and much has been learned from research after the discovery that monkeys and mice were susceptible and that the danger for workers might be reduced almost to vanishing point by serum-virus inoculation.

Fresh ground has been broken in the discovery of a new rural type of yellow fever which can occur in absence of *Aedes aegypti*, in places where the land has been incompletely cleared of forest and jungle and in isolated spots. Its mode of transmission in these circumstances has

yet to be determined. Other research has been directed to improving the method of vaccination, and work is being prosecuted in laboratories in New York City, in Rio de Janeiro, and in the Institut Pasteur, Paris.

Much also is being attempted and a good deal accomplished in investigation of and research into *malaria*. There is the Malarial Experimental Station in Italy, under Professor Missiroli in Rome, and small laboratories are established elsewhere. Work of a preventive and control character, by drainage, by engineering measures and by field experiment in many parts of the world is in progress—in Albania, Bulgaria, Greece, Spain, Portugal; in Colombia, Panama, Costa Rica, Porto Rico, Jamaica, the Virgin Islands, the Philippines.

By field study five varieties of *A. maculipennis* in addition to the type *A. maculipennis*, Meigen, have been found in Europe, viz.: *messeae*, Fallerini, *melanoon*, Hackett, *atroparvus*, van Thiel, *labranchiae*, Falleroni, and *elutus*, Edwards. Further new drugs in treatment are being tested, the experimental work being first carried out on avian malaria.

Nations infested by *hookworm* again claim a large share of the benefactions of the Rockefeller Foundation. Re-surveys have been undertaken in the southern United States; soil sanitation is being taken in hand, especially in Egypt, control measures in Samoa and the South Pacific Islands and elsewhere and research into the relations and connexion between defective nutrition and hookworm anaemia.

Special mention must be made of *yaws* control in Jamaica and the study incriminating *Hippelates pallipes* as the most likely vector in the island [see this *Bulletin*, 1935, Vol. 32, p. 885 and Suppl. p. 233*]. The extensive campaign for treatment of the disease in Western Samoa must not be forgotten [*Ibid.*, 1934, Vol. 31, Suppl. p. 165*].

Tuberculosis investigations are being pursued in the West Indies, and in the United States, in rural Michigan, in Tennessee, and the question of control in Panama and Porto Rico. Mention of other diseases in which study is being carried on should not be omitted, such as diphtheria, Rocky Mountain fever and undulant fever.

Apart from all this the Foundation gives aid to State and Local Health Services in Tennessee, in Quebec, in the United Provinces (India), in China and in Java. It has also divisions of Vital Statistics and Epidemiology, and it supports many Public Health laboratories, and nursing and education and schools of Hygiene. Whether the Rockefeller Foundation has or has not a motto, it certainly is a firm believer that *nullus argento color est, nisi temperato splendeat usu* and thereby effects the greatest good to the greatest number. H. H. S.

LONGMANS' AFRICAN HYGIENE PICTURES. No. 1. Water. No. 2. Flies. No. 3. Mosquitoes. No. 4. Worms and Disease. [Size $22\frac{1}{2} \times 30$ ins.; 2s. the set.] How to use the Hygiene Pictures. A Teachers' Handbook.—15 pp. [6d.] 1935. London: Longmans, Green & Co. Ltd.

These publications consist of four black-and-white wall pictures for use as subjects of hygiene lessons in African schools, and a leaflet giving practical suggestions to teachers on how the pictures can best be used in class teaching. Each picture gives several scenes of African life illustrating the lesson it is designed to teach. Thus the first picture shows a water supply being fouled by cattle, and by human beings washing themselves or their dirty clothes in it, or using the bank as a latrine, and brings home to the African children the important lesson

that the village water supply must be kept clean by enclosure or other means, and that drinking water should be boiled. The second picture shows how flies carry disease and how they may be got rid of, or at least prevented from doing harm, by keeping the house clean, burning rubbish, covering foodstuffs, and other such measures. The third picture illustrates the life-history and breeding places of the two common disease-bearing mosquitoes, anopheles as carrier of malaria and culex as carrier of filaria, and shows how they may be controlled by cutting the grass and clearing the bush round the houses, and by clearing up old tins and swampy ground and putting kerosene on the top of water in tanks. The fourth picture, which is perhaps the most difficult of the series for children to understand, is entitled "Worms and disease." It shows the life-history of the tapeworm, guineaworm, bilharzia and hook-worm, and sums up methods of prevention in the words "Boil your drinking water. Cook your food thoroughly. Wash uncooked vegetables. Build a pit-latrine and use it." R. L. S.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

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[No. 3.]

SLEEPING SICKNESS.

LESTER (H. M. O.). **Report of the Tsetse Investigation.**—*Nigeria Rep. Med. & Health Services for Year 1934.* Appendix B. pp. 69–88.

In order to provide more funds for sleeping sickness work in the field and for the equipment of sleeping sickness dispensaries, there has been a curtailment of the research side of the work, and the posts of Senior Sleeping Sickness Officer and Assistant Veterinary Pathologist have been abolished. Although Gadau is an excellent site for a research station, its inaccessibility has made co-ordination of the various field activities and co-operation with the administration increasingly difficult. For these reasons the head office was moved to Kaduna. In future the European Staff of the investigation is to consist of the Deputy Director at Kaduna, the Sleeping Sickness Officer, the Entomologist, and the Technical Assistant at Gadau, and six Sleeping Sickness Medical Officers in the field.

Research Work.—A series of new chemical compounds were supplied by the Bayer firm for examination of trypanocidal properties. The experiments started in 1933 with Surfen C and Sdt.386B and have been continued. In addition observations have been made with preparations 6210 and 6558, which are of a character similar to Surfen C and contain no heavy metal, and with preparations 5547, 6690 and 7217, which are compounds of arsenic and antimony.

Surfen C is unlikely to be of much value in the treatment of man, owing to its destructive action on the kidneys. In mice the drug was effective against *T. brucei* and *T. congolense* and strains isolated from man. With sheep infected with strains of *T. vivax* and *T. congolense* a dose of 10 mgm. per kilo proved to be more effective than a standard dose of tartar emetic, but three doses of Surfen C given at weekly intervals did not prevent relapse. Preliminary experiments on cattle infected with *T. vivax* and *T. congolense* having proved hopeful, it was decided to extend the work and to compare the action of one intramuscular injection of Surfen C with that of three injections given at weekly intervals, and with a course of 3 weekly injections of tartar emetic on groups of cattle infected with pure *T. vivax*, *T. congolense*, and a mixed infection of these trypanosomes. Some 30 animals were allocated to each experiment. Of these, 6 were given 3 weekly doses of Surfen C (10 mgm. per kilo.), 12 were given single doses of the drug, 6 were given the routine course of tartar emetic (0.06 to 0.08 cc. of a 4 per cent. solution per kilo. of body weight), and 6 were left untreated

as controls. Details of the experiments, which were unfortunately somewhat complicated by an outbreak of rinderpest, are given in a table. From the point of view of a definite cure, the results were not good, as the majority of animals relapsed within a few weeks. These findings differ from those of Hornby in Tanganyika, who reports that the majority of *T. congolense* cattle, which he treated with one dose of Surfen C, did not relapse. Although the three doses of Surfen C failed to sterilize the infection, it is to be noted that 100 per cent. of the animals were alive after six months, whereas only 6.2 per cent. of the controls survived for the same period.

The action of Sdt.386 B in mice infected with *T. brucei* was much the same as that of Surfen C. It was fairly active against strains isolated from man, but not good against *T. congolense* in mice. Some preliminary tests have been carried out on man. The initial dose was 0.1 gm. and this was followed by 0.15 gm., 2 grams, 25 gm., and 0.3 gm. at weekly intervals up to a total of 1.75 gm. [So given in the text, probably misprints for 0.15, 0.2, 0.25, and 0.3 gm.] With 4 late cases the results were not good; the patients continued to go downhill and a treatment of trypanamide had to be instituted. The earlier cases reacted better, and brief notes are given of 11 such cases. Although the drug was active in these cases, it was not so effective as a course of Bayer 205 would have been.

The other preparations from the Bayer Company referred to above were tested on mice infected with various trypanosomes.

Compound S. 107.—This substance was sent to the author by the reviewer, who had selected it from a large number of arsenical compounds prepared by Professor Morgan under the auspices of the Chemotherapy Committee of the Medical Research Council. The drug was tested on eight cases of sleeping sickness; an initial dose of 1 gm. and subsequent doses of 2 gm. were given at 5 or 7 day intervals, until 25 to 30 gm. had been administered. The stimulant action was very pronounced and led to the difficulty commonly met with in experimental work with trypanamide. The patients felt so much better that they became tired of the prolonged treatment and absconded before they had completed the course of injections. In every case patients showed very rapid clinical improvement and thought themselves completely cured after they had received 5 or 6 injections. In one case trypanosomes could still be detected in the blood after the 9th injection, but disappeared later, and in two cases trypanosomes persisted after the 6th but disappeared by the 9th injection. In two cases which completed the full course of treatment, the cerebrospinal fluid cell count fell from 332 to 1 and from 238 to 39, respectively; in the third there was an increased cell count at the time of the final examination. Taken as a whole, the results were definitely promising. No late cases were included in the series, but it is noteworthy that one very advanced case, which had failed to react to full courses of trypanamide, of Bayer 205, and of Antrypol, for some reason or another improved markedly on being given a course of this new drug. At the suggestion of the reviewer, who had found that S.107 was less toxic than trypanamide, these observations are being extended and the patients are being given initial doses of 1.5 gm. and subsequent doses of 3 gm.

An experiment to ascertain the effect of exposing "premunised" animals to fresh infections did not give very hopeful results, as, up to the time of writing, *viz.* two months after the first exposure to *G. morsitans*, 6 of the 9 "premunised" cattle have died.

During the last three years various strains isolated from man and originally sensitive to tryparsamide have been maintained in guinea-pigs which have been given increasing doses of this drug. Although many hundreds of injections have been given, the strains are not yet completely insensitive to a dose of 4 gm. of tryparsamide per kilo. Lester writes that the fact that it is so difficult to induce an artificial drug-resistance in strains maintained in guineapigs shows that the natural resistance of the host must be an important factor in the production of this artificial resistance. There is, as yet, no experimental proof that repeated ineffective treatment of a human case of sleeping sickness with tryparsamide can make the strain resistant to that drug. We know that resistant strains are comparatively common, but as such strains have been isolated from untreated cases, in districts where no sleeping sickness work has been done previously, it is certain that in many cases this resistance to drugs must be a natural characteristic of the strain. The question whether ineffective treatment in man can make trypanosomes increasingly drug-resistant is an important one and the point is now being investigated.

Experiments on fly transmission showed that it was noticeably easier to pass a strain isolated from man through *G. tachinoides* than through *G. submorsitans*. In dissections made in the field infections in *G. palpalis* are usually found to be very scanty, whereas in *G. tachinoides* an infection rate of 20 per cent. is common at a certain time of the year. Similarly, under laboratory conditions it seems easier to transmit human strains through *G. tachinoides* than through *G. palpalis*. This appears to be an important point, and possibly accounts for the divergent views of workers in East and West Africa on the question of non-transmissible strains.

From the Report of the Entomologist, it appears that for nearly two years frequent censuses of the tsetse population have taken place along a track of 3½ miles in length; this track passes through different types of tsetse bush. At the beginning of the rains the population of *G. submorsitans* starts to increase and reaches its maximum by the end of the wet season. Soon after the dry season begins, the population starts to decrease, and from December to April it is at its lowest. These facts in the main also hold good for *G. tachinoides*, and furnish a further argument for making anti-tsetse clearings early in the dry season. Not only do they then produce more lasting damage to the vegetation, but they strike at the fly community when it is entering upon an unfavourable season.

Other entomological work includes an experiment on the longevity of tsetse. This is tending to show that the patches of riverine forest are not such perfect dry sanctuaries as had been surmised, but that the fly just manage to survive the climate of the dry season in sufficient numbers to continue the species.

The remainder of the Report is concerned with the Sleeping Sickness Service. During the year 43,017 cases of sleeping sickness have been diagnosed by the Tsetse Investigation staff. Of these less than 600 cases have been treated previously. Altogether 47,187 cases have been treated during the year. Throughout the period six fully equipped teams have been at work in the field, each consisting of one medical officer, 2 African nurses, and 18 to 24 trained African dispensary attendants.

The great majority of the cases have been treated with a course of 20 to 25 gm. of tryparsamide. Adult patients have been given an

initial dose of 1 gm., followed by 2 gm. doses at 5-day intervals. It has been found that in the field it is not safe to give larger doses than 2 gm., nor to make the period between 2 injections less than 5 days. The occurrence of ocular symptoms was much more common when attempts were made to intensify the treatment. Portable stills were supplied to each team and distilled water was used for practically all injections. This was found to be a great improvement. In the past, patients complained of a variety of mild toxic symptoms, particularly after the second injection. It had been noticed that this was a very local occurrence; in some areas nearly all the patients complained of malaise, headache and fever. In rare instances there was actual diarrhoea and vomiting. Such symptoms only occurred when boiled and filtered water was used instead of distilled water.

Antrypol, a British made substitute for Bayer 205, was available towards the end of the year. Patients are at present being given 3 doses each of 1 gm. of Antrypol, followed by a course of 9 to 11 gm. of tryparsamide; with both drugs the interval between injections is 5 days.

An account of the work of the six sleeping sickness teams is then given and their observations are summarized in a table. *W. Yorke.*

GILL (C. W. Hope). **The Problem of *T. gambiense* Sleeping Sickness in Southern Nigeria.**—*West African Med. Jl.* 1935. Jan. Vol. 8. No. 3. pp. 10–15. [11 refs.]

In this lecture the author gives a general account of sleeping sickness. It contains nothing new. *W. Y.*

NIGERIA, COLONY AND PROTECTORATE OF: ANNUAL REPORT OF THE VETERINARY DEPARTMENT 1934 [HENDERSON (W. W.), Chief Veterinary Officer]. [**Trypanosomiasis** pp. 11–13.]

Trypanosomiasis in Nigerian cattle is widespread and causes serious economic losses. In the great majority of cases it assumes a chronic form, and when living conditions are favourable it frequently produces no apparent ill effects, but when conditions are unfavourable—shortage of food, cold and wet weather—it frequently causes death.

The only practicable method of dealing with the problem is the curative treatment of sick animals. During the year 14,000 cattle have been treated with 3 or 4 intravenous injections of a 4 per cent. solution of tartar emetic every 5 or 7 days [dose not stated]. The results on the whole have been good and the treatment is popular with the owners. Brief details are given of 275 cattle treated in this way; 17 (6 per cent.) died during treatment or within 3 months thereafter. It is stated that without treatment the death rate may be as high as 50 per cent., and in addition there is economic loss from general ill-condition.

A summary of the result of treatment by this method at the immunization camp at Zaria is given by the Deputy Chief Veterinary Officer, Mr. Griffiths. During the past four years 10,854 cattle have been treated, and provided the animals were not too emaciated and weakened there was almost invariably an improvement. The actual deaths while under treatment amounted to 2·8 per cent., but this mortality is among animals able to travel into camp from a distance; among animals treated by itinerant inoculation in the bush the mortality may be as

much as 10 per cent. or even higher. The general opinion among officers of the veterinary department is that, provided the antimony tartrate treatment is carried out before the disease has progressed to the stage when the animals are weak and emaciated, the results are good. It is also stressed that the treatment is extremely cheap and this is, of course, a very important matter.

The drug is also used as a prophylactic for trade cattle travelling by road, in order to reduce the losses which often occur during the journey. These injections have become popular with cattle traders. Experimental work is being carried out in collaboration with the Director of Tsetse Investigation on the curative value of a Bayer product known as Surfen C. W. Y.

MACLEAN (G.). Die Bekämpfung der Rhodesiense-Form der Schlafkrankheit in Tanganyika. [**The Fight against Rhodesian Sleeping Sickness in Tanganyika.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Sept. Vol. 39. No. 9. pp. 381–389. With 1 fig.

This paper gives a general account of the measures which are being adopted in Tanganyika to combat sleeping sickness.

The two tsetse concerned in the spread of *rhodesiense* sleeping sickness in Tanganyika are *G. morsitans* and *G. swynnertoni*, although it is possible that *G. pallidipes* may play a small part. How *T. rhodesiense* was introduced into Tanganyika is unknown. Possibly it was brought in by travellers or soldiers infected in Nyasaland, Portuguese East Africa or Rhodesia; possibly *T. gambiense* from the Congo, Uganda or various foci in Tanganyika itself had become modified by change of insect vector into *T. rhodesiense*; possibly it originated from *T. brucei* of game; or possibly the original inhabitants of the country were able to harbour the parasite with little evidence of disease.

However the disease was introduced, there can be no doubt that an important factor in the production of the epidemics of *rhodesiense* sleeping sickness has been the dispersal of the natives about the country and their consequent more intimate contact with tsetse.

In order to combat the disease it is necessary either to attack the virus by treating the sick, or to break the contact between man and the fly. In practice it is extremely difficult to achieve success by one of the measures alone, the best results are obtained from a combination of both lines of attack. The methods of treatment employed in Tanganyika are:—

(a) *Early cases.*—Bayer 205, 1 gm. weekly for 4 weeks; or Bayer 205, 1 gm. on the 1st, 3rd, 5th and 8th days, and 1.5 gm. on the 15th, 22nd and 29th days.

(b) *Advanced cases.*—After a series of injections of Bayer 205, a course of 12 weekly injections of 2 or 3 gm. of tryparsamide.

In a country of more than 450,000 square kilometres covered with tsetse bush, and in which the population is rarely more than 10, and often only 1 or 2 persons per sq. kilometre, it is obviously impossible to search out all the sick and treat them. Obviously it is first necessary to bring the people together into closer settlements, and this has the great advantage of increasing the areas under cultivation and so lessening the contact between man and fly.

In 1922, during the epidemic in Maswa, no Bayer 205 was available, but fortunately there existed in the neighbourhood a wide stretch of

open land in which the people could be settled. In Ukonongo, however, there existed no such free land, so an especially fertile region was selected in the bush and the natives caused to farm it, thereby producing a centre in which the treated sick could earn their living and at the same time lessen contact between man and the fly. There was the possibility that the aggregation of so many sick might lead to a spread of the disease, but it was hoped that this could be prevented by the use of Bayer 205. Nyonga was chosen for the first experiment of this kind. At the middle of 1925 Nyonga was inhabited by only two or three families, and apart from the small clearings made by these people there was nothing but fly-infested bush. The settlement commenced in August, 1925, and the subsequent history is shown in the following table :—

Year	Area of cultivation sq kilometres	Inhabitants	Infected with <i>T. rhodesense</i>
1925	8	1,400	Per mille 28.0
1926	23	2,326	9.45
1927	27	3,000-4,660*	4.30-6.67
1933	65	3,222	4.0

*Census inaccurate.

Details are given of other similar schemes.

W. Y.

UGANDA PROTECTORATE ANNUAL REPORT OF THE VETERINARY DEPARTMENT FOR YEAR ENDED 31ST DECEMBER, 1934 [POULTON (W. F.), Director]. pp. 9-11.—*Glossina* Investigation and Reclamation.

The *G. morsitans* reclamation work in South Ankole during 1934 was directed towards the control of grass fires and general observations on "fly" density. The unusual dryness of the year made it apparent as early as April that great difficulty was going to be met with in protecting the South Ankole clearings from unauthorized burning of grass and from premature firing. Some of these difficulties are described.

The various acacias and *Euphorbia candelabra*, and also the rhus and grewia thickets, showed to an increasing extent the cumulative effect of controlled annual burnings, and the great majority of the uncut areas have become far more open than they were three years ago; there is, moreover, a strong impression that in certain areas the grass growth and grazings have improved.

In uncut areas there is a continued decrease in fly catches, and in the clearings the fly has entirely disappeared apart from an occasional straggler. The concentration of *G. morsitans* in the North Kabiganda, referred to in the 1933 report, suffered rather more disturbance in 1934 than was anticipated, owing to increased mining activity, and cars leaving that area were estimated to carry not less than 50 to 60 flies per journey from the untouched focus to the main road on the south, or to the track by the uncut belt of acacias there situated and from which *G. morsitans* had previously almost entirely disappeared. The position was met by "catching" in the acacias and by the construction of a grass-walled fumigation house across the car track.

Cultivation in this section is steadily increasing round the base of the hills, and sheep and goats are being kept in increasing numbers. The entire "fly" country of South Ankole presents a very different feature from that of 1930, when the population was sparse and density of thorn-bush and tsetse was very great.

It was stated in last year's Report that the country to the north of the River Ruizi appeared free from tsetse, but more recent work has shown the presence of several small foci which have probably been the cause of the fairly constant outbreaks of trypanosomiasis in cattle.

W. Y.

UGANDA PROTECTORATE ANNUAL REPORT OF THE VETERINARY DEPARTMENT FOR YEAR ENDED 31ST DECEMBER, 1934 [POULTON (W. F.), Director]. Appendix II. pp. 26-28.—**Trypanosomiasis** [METTAM (R. W. M.), Veterinary Pathologist].

In last year's report it was stated that a number of game had been inoculated with *T. congolense* and *T. brucei*; attempts made during the present year to reinfect a duiker and a waterbuck failed. This work suggests that in nature the game acquire a transient infection and thereafter resist further infection. If this be so they would, except for a short period, be non-infective for tsetse. A young oribi caught in a non-fly area was inoculated with *T. congolense*; it made a natural recovery after a transient infection. A wild pig resisted infection with this trypanosome, thus confirming similar observations made in previous years.

There is an impression that *T. congolense* in cattle on Buvuma Island is being transmitted mechanically by some of the many voracious blood sucking flies which exist in great numbers near the kraals, viz., Tabanids, Haematopota, Lyperosia and Stomoxys. The few *G. pallidipes* present can play only a subsidiary rôle; *G. palpalis* is numerous, but dissections show that very few are infected with *T. congolense*.

Experiments with *T. brucei* and *T. rhodesiense* show that both parasites are definitely pathogenic for stock for about six months after infection, but that if the animals are cared for and well fed they steadily put on weight and recover. It is, however, fallacious to regard *T. brucei* as a non-pathogenic parasite for cattle, as is believed by many workers. *T. brucei* is a serious menace to cattle in a *G. morsitans* area, and when superimposed on *T. congolense* causes a more rapid decline of health and is more fatal than *T. congolense* alone. It is stressed that it is extremely difficult, if not impossible, to diagnose *T. brucei* in the bovine without recourse to small animal inoculations; and that *T. brucei* is extremely resistant to treatment; of all the drugs tested during recent years, only Surfen C has given encouraging results. It is believed that owing to the difficulty of diagnosis the part played by *T. brucei* in bovine trypanosomiasis has not been fully recognized in the past; many cases regarded as pure *congolense* infections, especially those which have resisted antimosan or tartar emetic and have relapsed, have subsequently been found infected with *T. brucei*.

Further experiments have been made on the action of Surfen C in *T. congolense* and *T. brucei* infections. The dose (100 cc.) is divided into two parts and injected intramuscularly; there is no local or general reaction. Nineteen cattle infected with *T. congolense* were treated in this way; one was in very poor condition and died, but the rest

recovered and subinoculation tests suggest they are sterilized. Surfen C gave equally good results with two cattle infected with *T. brucei*. Prophylactic tests have given promising results. W. Y.

SOUTH AFRICAN MEDICAL JOURNAL. 1935. July 27. Vol. 9. No. 14. p. 474.—**Sleeping Sickness in the Bechuanaland Protectorate.**

This editorial article draws attention to the existence of a focus of human trypanosomiasis in Ngamiland on the borders of the South African Union. In Ngamiland chiefly in the Okavango and Chobe swamps a fatal disease, called by the natives Kgotsela, meaning light, intermittent slumber, has been known to exist. In 1909 Dr. MOFFAT of the Bechuanaland Medical Service investigated the disease, but his findings were inconclusive. In November, 1934, Dr. MCKENZIE reinvestigated the disease in natives in the Chobe district, and succeeded in proving that it was in reality trypanosomiasis. Obviously it is of importance to the Union that the whole situation should be carefully examined. W. Y.

PORTUGUESE GUINEA. École de Médecine Tropicale. Rapport de la Mission Médicale à la Colonie de Guinée en 1932 [DE SEQUEIRA (Luís Artur Fontoura)]. [School of Tropical Medicine. Report of the Medical Mission to Guinea in 1932].—86 pp. With 10 photos on 5 plates, 1 folding map & 46 figs., tables and graphs. Lisbon.

In his introduction the author quotes from the reports of previous investigators which indicate an amazing ignorance regarding the question whether or not sleeping sickness actually existed in Portuguese Guinea.

The author arrived at Bolama in April, 1932, and found a case of sleeping sickness on the Island almost immediately. At the end of the month he moved inland and established his laboratory at Buba; after spending May and June examining the population of this district he shifted his laboratory to Bissau and transferred his attention to the north and east of the Colony. Later he returned to Buba with a motile laboratory in order to examine the infectivity of the three species of *Glossina* which exist there. At the end of November, after spending 7 months in the Colony, he returned to Lisbon accompanied by 3 cases of sleeping sickness in order to make a study of the trypanosomes with which they were infected.

The report is divided into three sections:—The first deals with human trypanosomiasis, the second with trypanosomiasis of domestic stock, and the third with *Glossina* and their degree of infection. Before leaving the Colony the author addressed a letter to the Governor enclosing particulars of 18 cases of sleeping sickness which he had discovered in various parts of the Colony. The general conclusion reached regarding human trypanosomiasis in Portuguese Guinea is that it is mildly endemic and is distributed irregularly throughout the Colony. The journeyings of the author and the distribution of human trypanosomiasis and the various species of *Glossina* (*palpalis*, *longipalpis*, *submorsitans* and *fusca*) are indicated in a map.

The first portion of the report consists of a lengthy clinical account of the disease as found in Portuguese Guinea, and this is followed by an equally long account of the trypanosome itself; it contains nothing new. In the second portion of the report the author remarks that he

has examined only animals which looked ill. Of these 28 per cent. proved to be infected. The usual three parasites were found, *viz.*, *T. vivax*, *T. congolense* and *T. brucei*; a lengthy account of the morphology and pathogenicity of each is given, but here again there is nothing new. The third section contains a table showing the number of *G. longipalpis*, *G. palpalis* and *G. submorsitans* dissected and the percentage of each found infected with the various trypanosomes.

W. Y.

ZUMPT (F.). Das Glossinenmaterial der deutschen Museen, ein Beitrag zur Verbreitung der Tsetsefliegen. [**The Glossina Material in German Museums : a Contribution to Knowledge of the Distribution of the Tsetse-Flies.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Aug. Vol. 39. No. 8. pp. 328-337. With 1 fig.]

Since the publication of his former paper in April, 1935 [see this *Bulletin*, Vol. 32, p. 722], the author has extended his knowledge of the genus *Glossina* by referring to the collections in a number of German museums, and the distributional details now given are derived partly therefrom and partly from previously published records. *G. martinii*, which, as already stated (*loc. cit.*, p. 723), should in the present reviewer's opinion be regarded, provisionally at any rate, as a form of *G. palpalis*, was described by Zumpt from material from Bismarckburg, near the extreme southern end of Lake Tanganyika. Further examples of this form from Usumbura (at the opposite end of the Lake) and from Morogoro district (inland from Dar-es-Salaam) have now been identified, besides others taken in a sleeping-sickness camp at an untraceable locality called "Rumenge, Post Mdjidje." [There is grave reason to doubt the accuracy of the Morogoro record, since it is in the highest degree unlikely that any form of *G. palpalis* occurs in that region.]

To anyone familiar with the great collection of tsetse-flies in the British Museum (Natural History) the present paper will be found to contain little that is new, yet one or two details may be noted. The statement that the Berlin Museum possesses *G. brevipalpis* material from the River Omo is, so far as the reviewer is aware, the first published record of the occurrence in Abyssinia of any species of *Glossina*. Confirmation in this case is needed, as also in connection with the subsequent mention of the possession by the same Museum of specimens of *G. morsitans* from Massaua—an assertion which, if true, might conceivably have an important bearing on present events.

The synonymic list with which the paper concludes is compiled from well-known publications. E. E. Austen.

LE PORT (L. René). Les plexo-choroidites rhomboidiennes au début de la maladie du sommeil. [**Plexo-Choroiditis of the 4th Ventricle at the Beginning of Sleeping Sickness.**—*Bull. Méd. du Katanga.* 1935. Vol. 12. No. 2. pp. 41, 43-9, 51-5.]

The author describes certain changes in the choroidal plexus which appear very early in sleeping sickness and which, in his opinion, explain a number of hitherto inexplicable symptoms met with at the beginning of the disease.

These very early changes in the choroidal plexus are almost entirely confined to the 4th ventricle. Their immediate consequence is an interruption of the communications between the ventricles and the

subarachnoid space. The only real orifices by which these two cavities communicate are the foramina of Luschka, which lie between the cerebellar peduncles in the lateral angles of the 4th ventricle. These orifices are covered by the lateral choroidal plexuses of the ventricle. It is necessary also to mention the small foramen of Magendie, the permeability of which is doubtful, but which can nevertheless, when it is not reinforced by a fibrous thickening of the median plexus, serve the functions of a safety valve.

Obstruction of the foramina of Luschka results in separation of the subarachnoid space from the ventricles, where all the cerebrospinal fluid is produced, and this automatically causes a state of disequilibrium of the tension of the fluid between the two cavities. The occlusion may reach a point—fortunately very rare and transient—where all the fluid produced is retained in the ventricles.

This condition of intraventricular hypertension gives rise to a syndrome to which the author wishes to draw attention for it is responsible for a large proportion of the troubles met with during the first stages of sleeping sickness.

Occlusion of the foramina of Luschka is rarely complete; and if it is complete it is very rarely permanent. The usual condition is one in which the obstruction is sufficient to produce a slight disequilibrium between the intraventricular pressure and that of the subarachnoid space. Lumbar puncture reveals either a slightly diminished pressure or one that is normal. But clinically intraventricular hypertension manifests itself by the following symptoms:—headache, nausea, and a certain degree of somnolence or even of indifference. Headache is the most severe of these symptoms, the nausea is due to pressure on the 4th ventricle and is independent of troubles arising from digestive disturbances, and the somnolence has nothing to do with the toxic condition seen in advanced cases of the disease. Although papillary signs are rarely met with, a few patients may complain of floaters and flickerings. This little syndrome of intraventricular hypertension is not influenced by lumbar puncture.

When the lateral plexuses are hypertrophied to an extent that they completely occlude the foramina of Luschka, the syndrome of hypertension is much more pronounced. In this case the ~~typical~~ dominant signs are most intense headache and psychical troubles with suicidal tendency. A third sign may be indications of papillary stasis. It is interesting to note that although the syndrome increases progressively in severity, when it abates it does so suddenly.

In these cases the subarachnoid pressure is a little lowered, and that it is not more so is due probably to the fact that the intraventricular pressure forces the fluid bathing the cortical convolutions into the subarachnoid space. Lumbar puncture may relieve the patient instantaneously, because the removal of fluid may accelerate the extraventricular prolapse of the plexus blocking the foramina of Luschka or it may render effective the foramen of Magendie. If, after 24 hours, the patient's condition is not relieved, a further lumbar puncture should be made; if the tension is lower than at the first puncture, then obviously the desired removal of the obstruction has not been accomplished, and in order to avert damage due to hypotension a quantity of physiological saline equal to the volume of fluid previously withdrawn should be injected. If, however, the pressure is normal or raised, then either the block has been insufficiently removed or possibly the cavities still contain too much fluid; in such

cases more fluid should be withdrawn. This type of syndrome due to intraventricular hypertension is rare ; the author has met with it only 11 times out of 2,000 cases.

A third type which le Port has seen on only 4 occasions is that in which the foramina of Luschka and also that of Magendie are blocked by plexus, which is firmly fixed by fibrous adhesions. In such circumstances the patient dies quickly with exaggeration of the symptoms mentioned above. Details are given concerning these 4 patients.

Discussing the general evolution of plexo-choroiditis in trypanosomiasis, the author states that it is characterized by two phases ; firstly, a hypertrophic phase seen during the first stage of the disease, and secondly, a fibrous atrophic phase met with in the middle and last stages of the disease. The syndrome of intraventricular hypertension is therefore most marked in the earlier stages of the disease and tends to disappear later on. It is probable, however, that the fibrous transformation of the plexus seen in the later stages of the disease plays a certain rôle in the toxicity of the cerebrospinal fluid.

In 25 autopsies le Port has found 19 cases of more or less marked plexo-choroiditis of the 4th ventricle, and 2 cases of very severe plexo-choroiditis. Among the 2,000 sleeping sickness cases seen since 1929, 361 had slight hypertension, 11 had moderate or severe hypertension which was reducible, and 4 cases had a severe irreducible hypertension.

W. Y.

SICÉ (A.) & MOREAU (P.). Quelques réactions du système extrapyramidal au cours d'une méningo-encéphalite trypanosomique. [**Some Extrapyramidal Reactions in a Case of Trypanosomal Meningo-Encephalitis.**—*Bull. Soc. Path. Exot.* 1935. Oct. 9. Vol. 28. No. 8. pp. 722-726.]

Details are given of a chronic case of trypanosomal meningo-encephalitis in a Senegal soldier, who, the history shows, must have contracted the disease at least 3 years before he came under observation. When he was sent from Algiers to Marseilles in May, 1935, the only signs of disease were tremors of the tongue and fingers, the absence of abdominal reflexes and of the ankle jerks, and a slight reaction of the cervical lymphatic glands. The blood was negative both on direct examination and also when examined by the method of triple centrifugation : there was auto-agglutination of the red cells. Gland puncture showed the presence of trypanosomes. Lumbar puncture showed a clear fluid, pressure normal, 2,000 cells per cmm., albumen 0.85 per thousand, sugar 0.50 per thousand and chlorides 6.17 per thousand ; scanty trypanosomes were discovered on centrifugation.

The case had evidently progressed in the most insidious manner without affecting the general health. There was no history of fever, or emaciation ; nor during the three years he had spent in Algiers, after leaving French West Africa, did he show any evidence of apathy or lassitude, or mental disturbance.

W. Y.

DUKE (H. Lyndhurst). On the Factors that may determine the Infectivity of a Trypanosome to Tsetse.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. July 31. Vol. 29. No. 2. pp. 203-206.

Duke comments on CORSON's recent paper recording a remarkable instance of infectivity of *T. rhodesiense* in a reeduck for *G. morsitans*

[this *Bulletin*, 1935, Vol. 32, p. 709]. Evidence was obtained many years ago by Duke (1912) suggesting that residence in antelope (bush-buck and reedbuck) resulted in an increased infectivity of a strain to tsetse. More recent work has, however, shown that even in an antelope prolonged residence in one and the same host tends to weaken or even destroy altogether the power of a strain to infect fly. An example of this is cited [Duke, this *Bulletin*, 1933, Vol. 30, p. 769, and 1935, Vol. 32, p. 690].

In any discussion on the infectivity of trypanosomes to tsetse one should not ignore the possibility of the occurrence in the vertebrate of a cycle of development, the phases of which are definitely related to the behaviour of the trypanosome in the intermediate host. Miss ROBERTSON (1912) first drew attention to this possibility and stated that the trypanosomes in the blood of the vertebrate host vary from day to day in their infectivity to tsetse. Duke believes that the evidence which has accumulated since ROBERTSON's work is on the whole confirmatory.

Duke then passes to a consideration of CORSON's results in light of this view. CORSON concluded that the special suitability of the reedbuck's blood affords the best explanation of his phenomenal figures. Duke agrees inasmuch as the blood of antelope affords optimal conditions to the trypanosome of this species, but he does not believe that the reedbuck is peculiar in this respect. He thinks it likely the same phenomenon will be found to occur in other species of tolerant antelope.

The article concludes as follows :—

"As to whether the trypanosome has undergone a selective change, I believe that in a tolerant species of antelope *T. rhodesiense* will manifest its maximum transmissibility : restore it to a sensitive host, *i.e.*, one that succumbs rapidly to the trypanosome, and the transmissibility will diminish either at once or after a few passages in that species of animal. But even in the antelope, after a time, transmissibility will, I believe, diminish. This is at all events clearly indicated by my own experiments. It will therefore be of interest to learn whether the animal mentioned in this paper maintains anything like the high infectivity suggested by the two tests we have been considering."

W. Y.

ROUBAUD (E.). Les modalités atypiques de l'infection trypanosomienne cyclique chez les glossines. [**Atypical Examples of Cyclical Infections of Trypanosomes in Glossina.**]—*Ann. Inst. Pasteur*. 1935. Sept. Vol. 55. No. 3. pp. 340–364. With 5 figs. [33 refs.]

This paper is concerned with an inquiry whether the three methods of cyclical development in *Glossina* adopted respectively by the *vivax-cazalboui*, the *congolense-dimorphon* and the *gambiense-rhodesiense-brucei* groups of trypanosomes are always absolutely constant, or whether deviations from the type may occur from time to time. With this object in view Roubaud has re-examined the records made by BOUET and himself in 1910–1913 in the light of observations reported by later workers.

T. cazalboui.—After giving a detailed account of the well-known labro-hypopharyngeal method of development of this group of trypanosomes in *Glossina*, Roubaud draws attention to a fact which is not generally recognized, *viz.*—that the time when metacyclic trypanosomes appear in the hypopharynx does not coincide absolutely

with that at which the fly becomes infective. If it is true to say that only those *Glossina* in which the hypopharynx is invaded are capable of transmitting the infection, it is not true to say that invasion of the hypopharynx always, and immediately, renders the fly infective. This point is illustrated by reference to the report of Roubaud and BOUET, from which it appears that the flagellates require a certain time to accommodate themselves to the insect medium before they can undergo that metamorphosis which is essential for the production of metacyclic forms.

Modifications of the type of salivary infection.—DUKE (1933) has recently drawn attention to instances of spontaneous disappearance of infections in *Glossina*: he regards it as a rare phenomenon, but Roubaud thinks that in the case of *T. cazalboui* disinfection is far from exceptional. As far back as 1908 he noticed that the infection would disappear from the labial cavity in flies kept in captivity. These researches were continued in Dahomey and showed that, as the result of age and as the result of hygrometric conditions different from those which were met with by the fly in nature, the infection of the proboscis could be considerably modified. It appears that although under good conditions the fly may remain infected during the whole of its life, the infection may disappear more or less completely in flies withdrawn from their normal environment. The most customary state met with in this partial disinfection is that in which the labial infection has disappeared completely, whilst the hypopharyngeal infection remains. Examples are given of *G. palpalis* in which only a hypopharyngeal infection was found. One fly which died 111 days after its infecting meal showed exclusively small crithidial forms in the labial cavity; the hypopharynx was sterile. This fly had, however, fed on a goat the day before the death of the animal and became infected in due course; it appears, therefore, that during its last meal the metacyclic infecting forms had been completely discharged from the hypopharynx.

Experiments are recorded which were devised with the object of ascertaining the effect of atmospheric humidity on the infectability of *G. palpalis* with *T. cazalboui*. The results indicate that keeping the flies either in a saturated atmosphere or in a dry atmosphere exercised an unfavourable influence, the proportion of flies becoming infected under these conditions being much less than of those kept under normal conditions at a humidity of about 70 per cent. Further work showed that when flies were accustomed to a dry atmosphere for a prolonged period before the infective feeds, the subsequent inhibiting effect of the dry atmosphere was much less than in un-acclimatized flies.

From this work it appears that the degree of atmospheric humidity—especially dry conditions—exercises a definite influence on the type of infection: the metacyclic forms may not appear, or their development may be much retarded, the crithidia may disappear and the infection become localized for a short time in the hypopharynx, presaging a final extinction of the infection.

Similar observations on the loss of infection of the proboscis under unfavourable external conditions were made by BOUET and Roubaud (1911) on *G. morsitans* in the northern part of Dahomey and in Nigerian Sudan during the dry season. Immediately after capture 40 per cent. of *G. morsitans* were found to be infected with *T. cazalboui*; whilst, after keeping in captivity for 20 to 30 days, only 2 of 13 flies were

found infected. Other similar examples are cited. It was noticed that the hygrophilic species, *G. palpalis*, *G. tachinoides* and *G. longipalpis*, were undoubtedly more affected by desiccation of the atmosphere than the more xerophilic species such as *G. morsitans*.

TAYLOR showed that the evolution of *T. gambiense* in *G. tachinoides* was greatly influenced in a favourable direction by high temperatures. Roubaud records an observation made by him in Dahomey in 1910. In this case no evidence was forthcoming that high temperatures assisted the development of *T. cazalboui* in *G. palpalis*.

DUKE (1921) advanced the hypothesis that the kind of blood ingested by Glossina influenced the capacity of trypanosomes (*T. gambiense*) to develop in them; flies nourished on reptilian blood, after the preliminary infecting meal, exhibited a smaller proportion of infections than did those fed on monkeys. Roubaud (1910) nourished *G. palpalis*, which had had an infecting meal on goats infected with *T. cazalboui*, on birds and on reptiles, but did not observe any unfavourable effect on the development of the trypanosomes.

Roubaud gives reasons to believe that infections limited to the hypopharynx really represent the terminal stage of an infection which is on the way to extinction.

T. dimorphon-congolense.—After describing the typical mode of development of this group of flagellates in Glossina, Roubaud asks whether modifications are ever encountered. He records that he found a *G. longipalpis* in Dahomey with an infection of *T. dimorphon* entirely limited to the proboscis. LLOYD and JOHNSON (1923-24) observed progressive disinfection of the digestive tube of Glossina in immature infections of *T. congolense*. It seems that this infection once established in the proboscis persists during the life of the fly. The digestive infection may disappear, leaving the salivary infection intact, as Roubaud himself has shown when the flies are nourished on animals treated with arsenicals. DUKE (1913) has observed the same thing in the case of *T. brucei* and *T. gambiense*. But we have not much information that the same thing can happen under natural conditions. Roubaud observed in a *G. longipalpis* in Dahomey a complete infection of the proboscis with *T. dimorphon*; the pharynx, proventriculus and anterior intestine were completely negative, but at the termination of the midgut the remains of a culture of trypanosomes was found. This was apparently a case of advanced disinfection of the gut with an intact salivary infection. Another *G. tachinoides* showed a feeble infection of the digestive tract 47 days after the infective feed; the proboscis was completely negative. This might be an example of spontaneous regression of an anterior infection, but it is equally possible that certain flies may have a reduced infection of the gut for their whole life without ever developing an anterior infection. Miss ROBERTSON and later VAN HOOFF and HENRARD have made somewhat similar observations with *T. gambiense* and other trypanosomes, suggesting that the flagellates may multiply in the gut of the fly without ever extending to the salivary tract. A progressive and total disinfection of the digestive tube, leaving intact the salivary infection, is more difficult to understand, at least in the case of flies fed under normal conditions.

In so far as the trypanosomes of man are concerned there are on record a number of cases (DUKE, 1933, VAN HOOFF and HENRARD, 1934) in which the infection was exclusively salivary and the intestinal tube was completely negative. Possibly these were the result of

sterilization of the gut infection ; but in the case of the *T. congolense* infection at least there is nothing against the hypothesis put forward by Roubaud in 1909 that the salivary infection established itself directly and immediately without being preceded by a gut infection. Whether the salivary infection is ever lost cannot yet be regarded as settled.

T. pecaui.—BOUET and Roubaud have shown that the evolution of this trypanosome in *Glossina* is similar to that of the group *T. dimorphon-congolense*. DUKE (1921) expressed doubt on this statement, and especially regarding the site of the infection in the labial cavity and hypopharynx of *Glossina*. Roubaud writes that if *T. pecaui* belongs to the same group as *T. brucei*, it is curious that it does not invade the salivary glands, which is so characteristic of the group *brucei-gambiense-rhodesiense*. LLOYD and JOHNSON (1924) have observed that the absence of flagellates in the proboscis in the development of the polymorphic group of trypanosomes has been insisted upon too strongly. The Luangwa Valley Commission (1912) recorded an instance of the heavy infection of the proboscis, as well as of the salivary glands, of a *G. morsitans* infected with *T. rhodesiense*. LLOYD and JOHNSON in 7 cases (2 of *T. gambiense* and 5 of *T. brucei*) observed trypanosomes of the proventricular type in the proboscis. In the course of Roubaud's work with BOUET, invasion of the proboscis of *Glossina* infected with *T. pecaui* was noted in 4 of 4 cases in which the infection was confirmed by experimental inoculation. In 2 cases proventricular forms or crithidia were either fixed to the labrum or free in the labial cavity, whilst metacyclic forms were found in the hypopharynx. In the other 2 cases infection of the labrum was not observed ; there was a total infection of the gut up to the pharynx and an infection of the hypopharynx. Roubaud believes that this state of things indicated an old infection in which that of the labial cavity had disappeared.

Invasion of the salivary glands by this trypanosome was not seen, but Roubaud considers that it may possibly occur, but only as a secondary phenomenon. An essential fact is that the forms seen in the proboscis were capable of producing infection of the vertebrate host. DUKE (1933) observed that BRUCE was unable to confirm the observation made by the reviewer and his colleagues (1912), viz. that forms infective for the vertebrate were present in the gut of *G. morsitans* infected with *T. rhodesiense*. BOUET and Roubaud had, however, made a similar observation in the case of *T. pecaui*. [The section of this paper dealing with *T. pecaui* is especially interesting as it seems to have been generally accepted for many years that *T. pecaui* is synonymous with *T. brucei*. If what is written above is correct, then apparently *T. pecaui* cannot be identical with *T. brucei*.] W. Y.

PERUZZI (Mario). Polimorfismo e trasformazioni globulari di alcuni tripanosomi africani nei loro rapporti con la patologia. [**Poly-morphism of Certain African Trypanosomes in regard to their Pathology.**]—*Pathologica*. 1935. Sept. 15. Vol. 27. No. 527. pp. 577-586. With 3 text figs. & 24 figs. on 2 plates. [14 refs.] English summary.

The author states that the long, thin forms of the *brucei* group, with drawn out nucleus, compact and staining well, are the typical

forms which invade the host and maintain the species. The first manifestations of polymorphism appear with defects or anomalies of division and unequal distribution of the nuclear and kinetoplasmic elements; the leishmanial, crithidial and leptomonad forms, he states, are derived from intermediate, short forms. Anomalous forms are present in abundance in inflamed areas, in serous exudates, and it is of such that phagocytosis occurs. In the author's summary he maintains that "the polymorphism of the trypanosomes of the *brucei-rhodesiense-gambiense* group appears to be a morphological expression of anomalies of the development of the strain . . ." giving rise to atypical torpid beings incapable of further multiplication and destined to destruction by phagocytosis. The globular forms arise from these anomalous forms. . . . Both these represent degenerated individuals in which the strain shows a tendency to exhaustion after rapid multiplication in the vertebrate host and it is towards these that the first indications of exudative and tissue reaction are observable. [The article contains some (not very convincing) figures.]

H. H. S.

POINDEXTER (Hildrus A.). **Further Observations on the Relation of Certain Carbohydrates to *Trypanosoma equiperdum* Metabolism.**—*Jl. Parasitology*. 1935. Aug. Vol. 21. No. 4. pp. 292-301.

As the result of previous work [this *Bulletin*, 1934, Vol. 31, p. 594], the author concluded that the fermentable carbohydrates of the blood form an essential part in trypanosome metabolism. The present paper describes *in vivo* and *in vitro* experiments devised with the object of investigating this hypothesis further.

The conclusion reached is that the fermentable carbohydrates seem to exert an important influence on the rate of multiplication, survival time, and virulence of trypanosomes. Injection of insulin, which decreases the blood sugar, likewise decreases the rate of multiplication of trypanosomes, and prolongs the life of the host. It was noted that less insulin was required to produce a shock as the course of the infection progressed; this corresponded with the decrease in the amount of available fermentable carbohydrate in the blood and to the liver damage.

W. Y.

CULBERTSON (James T.). **Trypanocidal Action of Normal Human Serum.**—*Arch. Pathology*. 1935. Nov. Vol. 20. No. 5. pp. 767-790. [111 refs.]

This article gives an excellent review of the present position of knowledge regarding the trypanocidal substance in normal human serum. All the main papers dealt with have already received notice in this *Bulletin*. At the end the author gives a summary of the chief points discussed, and this is reproduced here for the benefit of those who have not followed recent advances in knowledge of the subject.

"The normal serum of man will destroy the trypanosomes pathogenic for animals (e.g., *T. brucei*, *T. equiperdum*, *T. equinum*, etc.) either in the test tube or in the body of rodents infected with these parasites. Human serum does not affect the trypanosomes pathogenic for man (*T. gambiense*, *T. rhodesiense* or *T. cruzi*), the common trypanosome of rats (*T. lewisi* or a trypanosome of newts (*T. diemyctyli*)). One of the human trypanosomes, *T. rhodesiense*, is distinctive in that it becomes susceptible to the action of human serum after it has been passed successively through mice. The serum

of no other animals, excepting certain monkeys, manifests trypanocidal activity. The serum of some monkeys, however, *e.g.*, that of the baboon, destroys not only the trypanosomes pathogenic for the lower animals but, as well, those infective for man.

"The trypanocidal substance of human serum is found in the globulin fraction of the serum. It is thermolabile, being destroyed wholly when the serum is heated at 64°C. for an hour, and being reduced rapidly when the serum is let stand at room temperature. The trypanocidal substance passes readily through Berkefeld filters and with diminished intensity through collodion ultrafilters. It is removed from a serum by absorption with trypanosomes or bacteria (the typhoid bacillus; *Proteus*). The substance exhibits its activity independently of all the known components of alexin. The essential substance in the human serum which brings about the trypanocidal effect is antigenic, and a specific anti-trypanocidal antibody develops in rabbits repeatedly treated with an active serum.

"The trypanocidal substance probably originates in the normally functioning healthy liver. It is found in the blood serum and in serous exudates. The cerebrospinal fluid and the urine are without trypanocidal power. The substance appears in infants at a very early age and may be present at birth. It is probably elaborated within the body of the young child, since it is found neither to pass the placenta nor to occur in human milk. The trypanocidal power is enhanced in women late in the period of gestation and is maintained at a high level for some time after delivery.

"It seems unlikely that the action of the trypanocidal substance is that of an opsonin or an agglutinin, and the property is manifested wholly without the intervention of alexin. Some investigators have felt it acts essentially as a chemotherapeutic substance. Susceptible strains of trypanosomes become resistant or fast to human serum after repeated exposure to the serum in a manner comparable to that in which they become resistant or fast to drugs.

"Since human serum affects only those species of trypanosomes which are pathogenic for animals and which are noninfective for man, and is without effect on the trypanosomes which are infective for man, it is by some believed that the trypanocidal action of the serum is responsible for man's immunity to the animal pathogens. It is known, however, that strains of animal trypanosomes which have been rendered serum-fast still are noninfective for man, and that strains of human trypanosomes (*T. rhodesiense*) which become susceptible to human serum after repeated passage through animals retain their infectivity for man. Furthermore, the serum-resistant parasite *T. lewisi*, which is wide-spread among rats, is apparently unable to infect man. The serum of patients with trypanosomiasis is as active in trypanocidal power as that of normal persons. It appears, therefore, that the immunity of man to the animal trypanosomes depends on factors other than the trypanocidal activity of the serum.

"The trypanocidal activity of human serum is sharply reduced in diseases which cause extensive destruction of the parenchyma of the liver. Less conclusive evidence of alteration in the potency of the substance has been offered in other infectious diseases (*e.g.*, tuberculosis and syphilis) and in those attributable to deficiencies in accessory food factors. No significant reduction is observed in human trypanosomiasis. It seems possible, from the observations of some workers, that the carrier condition in hemophilia can be identified by the absence of the trypanocidal substance from the serum.

"It appears not unlikely that trypanosomes are but one form of infectious agent on which a single destructive entity in human serum acts. The fact that both the trypanocidal and bactericidal substances are removed from the serum by absorption with either trypanosomes or bacteria points toward a close similarity between the trypanocidal and bactericidal powers. The trypanocidal activity, however, differs from the bactericidal property and resembles the virus-neutralizing function of human serum in being limited to the serum of man and a few closely related primates and in

occurring without the presence of alexin. If further study indicates that these effects are all manifestations of a single entity of the serum or, what seems more likely, that they arise in analogous manners, support for the assumption that these "anti-substances" arise by immunization through contact with the specific antigen is difficult to maintain, since at no time in life does the average person suffer subclinical or abortive infection with trypanosomes." W. Y.

ROBERTSON (Andrew). The Reticulocyte Response in Mice, Rats, Guinea-Pigs and Monkeys Infected with *Treponema duttoni*, *Trypanosoma gambiense* and *Plasmodium knowlesi*.—*Jl. Trop. Med. & Hyg.* 1935. Oct. 1. Vol. 38. No. 19. pp. 237-244. With 4 charts. [16 refs.]

The technique adopted was the usual one of mixing a drop of blood on a prepared slide covered with a dried film of brilliant cresyl blue. In each instance 1,000 red cells were observed (using a squared eyepiece) and the reticulocytes were expressed as a percentage. When spirochaetes or trypanosomes were present they were counted at the same time as the reticulocytes and the number per 1,000 red cells noted.

The author gives the following summary of his observations:—

"(1) Reticulocytes in mice at the first examination were found to vary from 2.2 to 12.7 per cent., average 5.49. The majority, however, had reticulocytes from 2 to 5 per cent.

"(2) Subjected to small daily bleedings there was a rise in the reticulocytes beginning about the third or fourth days and continuing up to from eight to fifteen days from the start of the examinations.

"(3) The average reticulocyte level in the mice over a period was between 3.5 and 4.5 per cent.

"(4) A marked reticulocyte response was observed after inoculation of the mice with *Treponema recurrentis* (*duttoni*). This began about four days after the first appearance of spirochaetes in the blood and reached its maximum four days after the maximum was attained by the organisms. The maximum reached was 36 per cent. reticulocytes.

"(5) After recovery the average reticulocyte level tended to be slightly lower, from 2 to 4 per cent., than previous to inoculation.

"(6) Older adult rats did not show a marked response to daily bleedings nor did their reticulocytes tend to show such variations from day to day as were seen in younger rats. The former averaged 2.85 per cent., while the latter was from 2 to 10 per cent. The younger adult rats had a reticulocytosis from 15 to 20 per cent., starting about the fifth day as a result of the bleeding.

"(7) Four young rats recovered from an infection with *T. cruzi* did not show a definite reticulocyte increase to [=at] the daily examinations and after being under observation for seventeen days their reticulocytes fell to and were maintained at a lower level. It is suggested that the disease had lessened the regenerating powers of the bone-marrow, as it were had produced an aplastic condition.

"(8) In guinea-pigs under conditions of daily blood examinations the reticulocytes are probably between 0 and 2 per cent.

"(9) When rats were inoculated with *T. gambiense* there was a reticulocytosis which was cut short owing to the swamping of the animal with trypanosomes. This rise in reticular cells followed the trypanosome increase after an interval of two to four days.

"(10) If drug treatment was administered (Bayer 205: 0.01 mgm. per grm. body-weight) at the height of the trypanosome infection the reticulocytosis continued for from seven to eighteen or nineteen days and usually reached its maximum about the fourth or fifth day.

" (11) After this maximal reticulocytosis, the reticulocytes tended to return to a level comparable to that observed before infection. Later, after about sixty days from inoculation, the trypanosomes again appeared and multiplied rapidly. This terminal rise of trypanosomes was paralleled by a reticulocytosis similar to that seen in untreated rats.

" (12) With *T. lewisi* infections the reticulocytes of young adult rats showed a response which closely followed the daily curve of the number of trypanosomes without the delay seen in *T. gambiense* infections. After the trypanosomes had disappeared finally from the blood there was a second reticulocytosis which graphically formed a plateau.

" (13) The bone-marrow from mice, rats and guineapigs with spirochaetosis and trypanosomiasis, showed a microcytic increase.

" (14) The reticulocytes in *Silenus rhesus* are probably from 0 to 2 per cent. when examined daily over a prolonged period.

" (15) With malaria (*P. knowlesi*) the reticulocytes tend to maintain a higher level. When atebirin is given in doses insufficient to cure the infection the maximal reticulocytosis may be delayed.

" (16) Malarial parasites of monkeys as a rule were found not to occur in reticulocytes.

" (17) The anaemia of experimental trypanosomiasis and spirochaetosis in mice, rats and guinea-pigs and malaria in monkeys when severe may result in the appearance of megalocytes, but the anaemia is essentially microcytic or hypochromic in character.

" (18) There was some correlation between the number of organisms, spirochaetes and trypanosomes, and the extent of the reticulocyte response.

" (19) It is suggested that the anaemia of spirochaetosis and trypanosomiasis is due to increased erythrolysis and further, as evidenced by the reaction in treated rats to the terminal rise of trypanosomes, that proof has yet to be adduced of any inhibitory effect of the organisms on the bone-marrow activity."

W. Y.

FRENCH (M. H.). Nitrogen and Mineral Metabolism in *T. congolense* Disease.—*Tanganyika Territory Ann. Rep. Dept. Vet. Sci. & Animal Husbandry 1934. Part V.—Research. pp. 59–64.*

From the work described in this article it was concluded that infection with *T. congolense* results in an increased rate of excretion of nitrogen, calcium, potassium and phosphates. Magnesium balances are apparently not disturbed. The effect on sodium and chlorine metabolism appears to be dependent upon the level of intake; on an adequate consumption, retention follows, but a negative balance results on low intake.

W. Y.

VAN DEN BRANDEN (F.). La réaction de Fulton ou " méthode au chlorure mercurique " chez les rats infectés de *Trypanosoma congolense* ou de *Trypanosoma brucei*. [*Fulton's Reaction in Rats infected with T. congolense or T. brucei.*—*Ann. Soc. Belge de Méd. Trop. 1935. Sept. 30. Vol. 15. No. 3. pp. 387–398.*

Fulton's reaction, or the mercuric chloride test, was employed by HORGAN, BENNET and KENNY (1929) in the diagnosis of trypanosomiasis among camels. The test consists in the addition of a drop of the serum of the suspected animal to solutions of mercuric chloride varying in strength from 1:10,000 to 1:100,000. The authors concluded that the serum of healthy animals is precipitated by the stronger solutions only, 1:10,000 to 1:20,000. Precipitation with intermediate strengths, 1:40,000 to 1:60,000, indicates that the case is probably one of trypanosomiasis, whilst precipitation with the weakest solutions, 1:80,000 and 1:100,000, warrants a positive diagnosis.

As the work of later investigators had cast some doubt on the specificity of the reaction van den Branden decided to examine the test with the serum of normal rats and of rats infected with *T. congolense* or *T. brucei*. In his earlier experiments he employed solutions of mercuric chloride of the strengths mentioned above. These, however, proved to be useless, as with only the strongest solution (1 : 10,000) was a precipitation observed. With this solution 4 per cent. of the normal sera gave positive results, 30 per cent. of the sera from *T. congolense* rats, and 33 per cent. of the *T. brucei* rats.

In later experiments he employed concentrations of mercuric chloride varying from 1 : 1,000 to 1 : 32,000. His results were :—

Of the normal sera 100 per cent. gave positive results with a concentration of 1 : 8,000 ; of the infected rats 100 per cent. gave positive results with a concentration of 1 : 16,000.

The conclusion reached is that Fulton's reaction is not sufficiently specific to be of value in the diagnosis of *T. congolense* and *T. brucei* infections of rats.
W. Y.

VAN SACEGHEM (René). Sur le diagnostic des infections dues à "Trypanosoma vivax" chez les bovidés. [The Diagnosis of *T. vivax* Infections in Cattle.]—*Bull. Agric. Congo Belge*. 1935. Mar. Vol. 26. No. 1. pp. 152-154. With 1 fig.

The author states that the best way to discover *T. vivax* in infected cattle is by gland puncture : the gland juice is often positive when the blood is negative.
W. Y.

SCHLOSSBERGER (H.) & GRILLO (J.). Experimentelle Untersuchungen ueber Misch- und Sekundärinfektion. VI. Mitteilung : Weitere Versuche ueber den Einfluss einer Mischinfektion mit Rekurrensspirochäten auf die trypanozide Wirkung des Germanins. [Further Experiments on the Influence of a Mixed Infection with Relapsing Fever Spirochaetes on the Trypanocidal Action of Germanin.]—*Zent. f. Bakt.* I. Abt. Orig. 1935. Nov. 15. Vol. 135. No. 4/5. pp. 203-215.

After contrasting the course of mixed infections of *T. rhodesiense* and various spirochaetes in mice with that of the trypanosome infection alone, the authors compared the effect of germanin on such mixed infections with its action on the pure trypanosome infection.

A series of mice were infected at the same time with *T. rhodesiense* and one of the following spirochaetes—*Sp. hispanica*, *Sp. obermeieri*, *Sp. duttoni*, *Sp. novyi*, *Sp. usbekistanica*, *Sp. crociduræ*, *Sp. turicata A*, and *Sp. turicata B*. The course of such mixed infections is shown in a table, from which it is seen that the *Sp. turicata A* and *B* did not influence the *rhodesiense* infection, but that the other spirochaetal strains to a varying degree exerted an inhibitory action on the trypanosomal infection ; sometimes this action was quite pronounced, whilst in other cases it was very slight. The authors came to the conclusion that the effect on the trypanosomes depended less on the particular spirochaetal strain employed than on the clinical course of the relapsing fever. The best action was observed in those individuals in which the attacks were short and the intervals long.

Whilst 10000 gm. of germanin per 20 gm. is a certainly curative dose in simple nagana infections of mice, in mixed infections of nagana and *Sp. hispanica* such a dose will only cure if it is given in the first

3 days. If, however, the drug is given on the first day of a mixed infection definitely smaller doses are curative, e.g. $\frac{1}{10000}$ gm. and $\frac{1}{10000}$ gm. and even less.

The authors record experiments which confirm the observations of v. JANCSÓ [this *Bulletin*, 1935, Vol. 32, p. 702] that blockade of the reticulo-endothelium lessens the therapeutic action of germanin. According to HASSKÓ the smaller curative action of germanin in mixed infections is due to the injury to the reticulo-endothelial system caused by the spirochaetes. The increase in the action of the drug at the commencement of mixed infections is probably the result of a two-fold action. Firstly, the greater portion of the trypanosomes are killed by the chemotherapeutic action of the drug and the capacity of the remainder to multiply is inhibited; secondly, after a relapsing fever crisis, there is hyper-regeneration of reticulo-endothelium and a consequent increase in the power of the host to deal with the trypanosomes which remain.

W. Y.

GRILLO (Joaquin) & SCHMITZ (Joachim). Chemotherapeutische Versuche bei mischinfektionen mit zwei Trypanosomenarten. [**Chemotherapeutic Experiments on Mixed Trypanosome Infections.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1935. July 29. Vol. 85. No. 3/4. pp. 203-217. [18 refs.]

Experiments here described were undertaken in order to ascertain whether the infection of rats and mice with two different species of trypanosomes in any way modified the response of the parasites to various drugs.

The double infection of rats with *T. lewisi* and *T. brucei* did not result in any obvious reciprocal influence on the infections; each developed in the usual way after the usual incubation period. The natural resistance of *T. lewisi* to germanin was in no way influenced by the presence of the nagana infection, nor was the sensitiveness of *T. lewisi* to the arseno-antimony-benzole derivative Sdt 355 increased.

Mixed infections of white mice with *T. brucei* and *T. equiperdum* ran the usual course of single infections, and the two parasites exerted no reciprocal effect on one another.

A strain of *T. brucei* rendered blepharoplastless by exposure to repeated small doses of acriflavine exhibited a definite resistance to acriflavine, but the usual sensitiveness to germanin. The dose of germanin required to cure mice with a double infection of *T. brucei* and *T. equiperdum* was the same as that necessary to cure single infections with either of these trypanosomes.

W. Y.

BARLOVATZ (A.). La réaction méningée atoxylique. [**The Atoxylic Meningeal Reaction.**]—*Bull. Soc. Path. Exot.* 1935. Nov. 13. Vol. 28. No. 9. pp. 823-826.

In the course of his work on sleeping sickness Barlovatz has studied the rapid reaction seen in changed cerebrospinal fluids (especially the protein content) immediately after the first injection of the drug in previously untreated patients. The author is in the present paper concerned with this initial change alone. The vast majority of his observations have been made after a dose of one of the following four drugs:—

Tryparsamide (tryponarsyl) 2-3 gm., Atoxyl (trypoxyl) 0.6-1 gm., Bayer 205 (moranyl) 0.8-1 gm., Tartar emetic 0.08-0.1 gm.

Sometimes these doses were repeated after an interval of a couple of days. Lumbar puncture was made on the day of injection and at latest a week afterwards.

The immediate results produced by an injection of the various drugs is summarized in the following table :—

	Leucocytosis	Albumen content
Tryparsamide (intravenous) ...	sudden fall	slow fall
Atoxyl (subcutaneous) ...	rise or plateau	rise
Bayer 203 (intravenous) ...	slight fall	plateau
Tartar-emetic (intravenous) ...	slight fall	plateau

Tryparsamide is thus followed by a rapid fall in the number of leucocytes in the spinal fluid ; within a few days the figure may reach one-third or less. During the following weeks there is the usual increase, but it is less formidable. The albumen content is much more stable than the leucocytosis and responds more slowly. It reacts, however, to atoxyl by a sudden and massive increase, which is the chief characteristic of the atoxylic meningeal reaction. The leucocytes usually show at first a moderate increase, but they may also rise rapidly.

The above is the general rule, but actually variations occur. The meningeal reaction may follow tryparsamide, but this is quite exceptional and happens in less than 1 per cent. of cases ; and it occurs in only about 5 per cent. of cases treated with germanin or tartar emetic. With atoxyl the reaction is sometimes very slight and it may fail altogether, but with this drug it is the rule rather than the exception.

Details are given in tabular form of 4 patients treated with atoxyl :—

Names	No. of days between the two examinations	Leucocytes		Albumen	
		Before	After	Before	After
Kasambula	(lumbar puncture) 7	150	165	0.40	0.48
	(occipital puncture) 6	130	120	0.30	0.44
Tshisupa	(lumbar puncture) 8	210	215	0.44	0.52
	(occipital puncture) 10	130	120	0.42	0.57
Mulenda	(lumbar puncture) 7	155	820	0.35	0.55
	(occipital puncture) 7	42	720	0.39	0.53
Beya	(lumbar puncture) 6	13	20	0.15	0.27

The general conclusion is that atoxyl often provokes, in the already changed spinal fluid of sleeping sickness cases, an increase of leucocytes and of albumen ; the increase is sudden and sometimes important. This meningeal reaction is not seen with the other three drugs, *viz.* tryparsamide, germanin and tartar emetic. W. Y.

VAN DEN BRANDEN (F.) & APPELMANS (M.). Les troubles visuels au cours du traitement de la trypanosomiase humaine par la tryparsamide (tryponarsyl, tryptan, novatoxyl). [Visual Disturbances in the Course of Treatment of Human Trypanosomiasis by Tryparsamide.]—*Bruxelles-Méd.* 1935. Oct. 20. Vol. 15. No. 51. pp. 1403-1421. [51 refs.]

Much of the work referred to in this paper has already been published elsewhere and summarized in this *Bulletin* [1934, Vol. 31, p. 573].

Attention is drawn to the fact that visual disturbances are met with in no less than 20 per cent. of second stage cases of human trypanosomiasis treated with tryparsamide. These accidents are serious because they involve both eyes and frequently lead to blindness as the result of bilateral optic atrophy. After considering the clinical characters of these visual troubles, the authors attempted to reproduce them in the rabbit with the object of throwing light on their pathological mechanism.

BROUARDEL and POUCHET, who have studied the poisonous effects of inorganic compounds of arsenic, have not noticed sensory disturbances. Acute poisoning produces choleraform symptoms: epigastric pain, vomiting, diarrhoea, aphonia and muscular cramps; death occurs on the third to fifth days with delirium and convulsions. Chronic poisoning develops in 4 periods: the first is characterized by digestive disturbances; the second is marked by cutaneous eruptions, erythemas, exfoliations, pigmentations, urticaria notably of the eyelids, and by laryngo-bronchial catarrh (sometimes aphonia), extending to the mucous membrane of the nose and conjunctiva. The third period is characterized by disturbances of sensation, numbness of the limbs, shooting pains; and in the fourth period palsies develop and the patient is easily fatigued. Cure is frequent, but convalescence is protracted; death, when it occurs, is due to lesions of the heart, liver and kidneys. Visual troubles following poisoning by inorganic arsenicals are very rare and quite different from the amblyopia due to aromatic arsenicals; a large dose of an inorganic arsenical may produce a central scotoma with great loss of vision and haemorrhages of the retina, but these troubles tend to disappear when the intoxication ceases.

Numerous cases of blindness have been recorded during the treatment of various diseases by pentavalent aromatic arsenicals, such as acetylarsan, stovarsol and particularly atoxyl and tryparsamide. The amaurosis produced by atoxyl is the gravest of the toxic amblyopias; when visual troubles proclaim themselves they almost always lead to blindness from optic atrophy. Visual disturbances have been frequently observed during the treatment of trypanosomiasis with tryparsamide by PEARCE, CHESTERMAN, MARUGO, LAIGRET, etc. The authors have observed them 24 times in 118 cases. Details of these cases are summarized in a table, and are discussed at some length [this *Bulletin*, loc. cit.]. From the clinical facts recorded in this part of the paper, the following conclusions are drawn:—

1. In poisoning by inorganic arsenicals visual troubles are rare and late. The symptoms and evolution are quite different from those observed in the course of a treatment with atoxyl or tryparsamide, and they are reversible.

2. The visual disturbances following treatment of trypanosomiasis with tryparsamide are frequent; they often occur early in the treatment and are only partially reversible.

3. These troubles occur almost exclusively in second stage cases of trypanosomiasis where the spinal fluid is changed; they are the more frequent as the spinal fluid is the more changed.

The next portion of the paper describes experiments undertaken with the object of producing optic changes in rabbits analogous to those seen in man. Van den Branden has already shown that when rabbits are given large doses (1.25 gm. per kilo.) of tryparsamide they develop renal lesions [this *Bulletin*, 1935, Vol. 32, p. 693]. So

far, however, optic atrophy has never been observed in these animals as the result of large doses of arsenicals. The authors therefore decided to attempt to reproduce experimentally in rabbits the optic lesions which are found in man. The rabbit was chosen as the experimental animal, because it is the animal which is usually used for testing arsenicals, and it lends itself readily to examination of the fundus by means of the electric ophthalmoscope. The drugs used were atoxyl and tryparsamide. Total doses varying from 60 cgm. to 8.5 gm. were given either intravenously or retrobulbarly; and not only pure, well-preserved products were used, but also old products, such as tryparsamide which has assumed a rose colour and is considered in Africa to be especially dangerous to vision.

The results of these experiments are given in a table. As they did not yield any positive result they were repeated in rabbits infected with *T. congolense*, which runs a relatively chronic course in these animals. The conclusions drawn from this work are:—

1. A single injection of tryparsamide (normal or changed) in a normal or infected rabbit does not produce optic atrophy comparable to that sometimes observed in man.
2. Repetition of weekly injections appears to be more harmful to the optic nerve. Ophthalmoscopic examination suggests that tryparsamide may produce vascular changes in the retina.
3. The changes in the fundus are more frequently seen in rabbits infected with trypanosomes than in normal rabbits.

The last portion of the paper is concerned with a discussion of the pathogenesis of the visual troubles occurring in man [this *Bulletin*, *loc. cit.*]. The general conclusion reached is that the lesions have a mixed origin. It is not denied that optic atrophy due to arsenicals occurs, and optic neuritis due to trypanosomiasis is certain; but these forms are rare. Usually the condition is seen in individuals suffering from chronic trypanosomiasis, the tryparsamide striking the final blow on an optic nerve rendered fragile by the ^Batral nervous infection. W. Y.

COLLIER (W. A.) & KRAUSE (Magdalene). Die chemotherapeutische Wirksamkeit von Arsenverbindungen schwefelreicher Eiweiss-spaltprodukte. [The Therapeutic Activity of Arsenical Compounds of Sulphen Rich Products from Proteins.]—*Ztschr. f. Hyg. u. Infektionskr.* 1935. July 18. Vol. 117. No. 2. pp. 190–195.

As the result of previous work the authors had reached the conclusion that probably organic components, consisting of high molecular decomposition products of keratin, rich in sulphur, would be an excellent vehicle for therapeutically active metals. A number of such compounds of arsenic were consequently prepared: these are condensation products of oxy-, amino-, and oxy-amino-phenyl-arsenoxides, and their substitution products with high molecular, sulphur-rich, decomposition products of keratin.

The condensation products, which were prepared in the laboratory of Johann A. Wülfing, Berlin, are bright-coloured, mainly white substances, and for the most part easily soluble in water, although some of them require the addition of sodium bicarbonate before they will form a clear solution. The arsenic content of 12 (labelled WI–WXII) of these compounds and their therapeutic indices in mice

infected with nagana are given in a table and contrasted with those of various salvarsans. It is seen that the arsenic content is relatively very low. The drugs were administered intravenously, subcutaneously and orally. Four of the compounds (W VI, W VII, W XI and W XII) showed a therapeutic index which surpassed that of neosalvarsan. The best was W VII on intravenous injection with an index of 1 : 45. On oral administration they gave good results. Rabbits in an advanced stage of the disease were cured. Certain of the compounds (W VII, W VIII, and W XI) proved superior to salvarsan in the treatment of *Sp. recurrentis* infections of white mice. W. Y.

HORNBY (H. E.). **On the Nature of the Resistance to Treatment shown by Some Cases of Bovine Trypanosomiasis.**—*Tanganyika Territory Ann. Rep. Dept. Vet. Sci. & Animal Husbandry 1934.* Part V.—Research. pp. 37–39.

Antimosan and tartar emetic still remain the standard remedies for infections due to *T. congolense* and *T. vivax*. All work on this subject suggests that the action of the two drugs is identical, and that if an infection is able to resist the action of one it is likewise able to resist the other. Of great importance to veterinarians are the researches of YORKE and his colleagues on drug-resistance. They showed that while it is extremely difficult, or even impossible, to produce a tartar emetic resistant strain by the ordinary direct method of administering sub-curative doses of the drug, it is extremely easy to produce a resistant strain from an atoxyl-resistant strain. They also showed that resistance to naganol (Bayer 205) does not involve resistance to antimonial compounds. It would appear, therefore, that, so long as we refrain from using arsenical drugs prior to antimonials, there is no danger of establishing antimony-resistant strains. Nevertheless, in practice some cases of trypanosomiasis seem to be incurable by antimonials, and the question arises whether this is due to idiosyncrasy of the host or wholly or in part to a treatment-resistant character of the particular strain of parasite. It was with the object of finding an answer to this question that the present work was undertaken.

Details are given of a buffalo infected with *T. congolense* which proved highly resistant to antimonials. The animal had to be destroyed as incurable on 30th January, 1933, after having received 34 injections of antimosan and tartar emetic between August, 1931 and January, 1933. A healthy animal was inoculated from this buffalo on 27th October, 1931, and this animal became infected and was cured by two courses of tartar emetic.

An ox infected with *T. congolense* was treated unsuccessfully with many courses of antimosan and tartar emetic between August, 1932 and March, 1934. At a late stage of the infection, in November, 1933, a healthy ox was inoculated with the blood of this animal, and from this two other oxen were subinoculated; both were quickly cured by antimosan or tartar emetic.

The general conclusion reached from this work is that unusual refractoriness to antimonial treatment is more often due to a host idiosyncrasy than to special resistance on the part of the parasite.

W. Y.

FRENCH (M. H.) & HORNBY (H. E.). Studies concerning the Effect of the Plane of Nutrition on the Course of Animal Trypanosomiasis. 1.—Introduction, and 2.—*T. congolense* Disease from Infection to Crisis.—Tanganyika Territory Ann. Rep. Dept. Vet. Sci. & Animal Husbandry 1934. Part V.—Research. pp. 40-58. With 11 figs.

Experiments are described from which it is concluded that the course of *T. congolense* disease from infection to crisis is uninfluenced by planes of nutrition higher than those of bare maintenance.

In their introduction, the authors point out that in tropical Africa the three trypanosomes of veterinary importance are *T. congolense*, *T. vivax* and *T. brucei*. There are quite definite differences between the diseases due to these three parasites, e.g. *T. brucei* produces a blood disease in rats and guineapigs, whereas in rabbits and goats the most pronounced lesions are in the more solid tissues; *T. congolense*, however, is essentially a blood parasite, and the disease due to it is essentially an anaemia. As *T. congolense* is at least as important as the other two parasites, and as its behaviour within the mammalian host is better known, the authors selected it for their first experiments. The experiments have been divided into two parts; the first dealing with the stage from infection to the crisis of impending death or commencement of recovery, and the second with the period of recovery.

Although there are neither cattle nor donkeys, and comparatively few sheep, goats and dogs within the thick tsetse belts of East Africa, owing to the fatal effect of continual infection by pathogenic trypanosomes, yet any single infection by itself is by no means necessarily fatal. In fact Hornby and BAILEY (1930) have stated the opinion that "uncomplicated disease due to a single infective dose is rarely fatal if a diet adequate to meet the calls of anaemia is provided."

Notwithstanding the fact that it is generally assumed that good feeding is essential to recovery from *T. congolense* disease, there are no precise experiments on the subject, or on the equally important question whether feeding influences the course of the disease in its earlier state. It is with the latter matter that the present paper deals. The experiments were conducted on 11 oxen of which two were uninfected controls. For details the paper itself must be consulted.

No indication was found that higher planes of nutrition exert a beneficial influence against the development of the disease. In all cases, whether good or poor rations were provided, the production of anaemia followed the same course, nor was there anything to suggest that nutrition influences the degree of infection. Better feeding did not help the formation of antibodies, since neither body temperature nor the degree of infection was influenced by nutrition. W. Y.

ROTHERMUNDT (M.) & RICHTER (R.). Experimentelles ueber Solu-Salvarsan. [Experiments on Solu-Salvarsan.]—Ztschr. f. Immunitätsf. u. Experim. Therap. 1935. Aug. 30. Vol. 85. No. 5/6. pp. 474-487.

Observations are recorded on the toxicity and therapeutic action of a new arsenobenzol derivative prepared by the I. G. Farbenindustrie under the name of solu-salvarsan.

The drug is supplied in solution ready for use, and can be given either intramuscularly or intravenously. The solution is slightly alkaline and is of such a strength that 1 cc. contains 0.02 gm. of arsenic.

The toxicity of the freshly-prepared substance and of the solution kept 30 days was tested on mice, rats and guinea-pigs. For mice the toxic dose was from 0.3 to 0.5 cc. and the tolerated dose was 0.25 cc. per 20 gm. of body weight; for rats the toxic dose was 5.0 to 7.0 cc. and the tolerated dose 4.0 cc. per kilo. of body weight; and for rabbits the doses on subcutaneous injection were respectively 3.0 cc. and 1.5 cc. per kilo. of body weight. Similar results were obtained with solutions kept for 30 days, no increase in toxicity being observed.

The therapeutic action of solu-salvarsan was determined in mice infected with nagana or Russian relapsing fever and in rabbits infected with syphilis. It was found that doses of 0.0125 cc. to 0.02 cc. cured nagana mice. In the relapsing fever mice 0.0125 cc. caused the disappearance of spirochaetes from the blood in 2 days and 0.025 cc. caused their disappearance within 24 hours. In experimental rabbit-syphilis the curative dose was 0.15 cc. per kilo.

From this work it appears that solu-salvarsan exhibits a strong parasitocidal action and is less toxic than other arsenobenzol derivatives. The therapeutic index of solu-salvarsan for mice infected with nagana is 1 : 20 as compared with 1 : 40 for neosalvarsan, but for mice infected with *Sp. obermeieri* the ratios are 1 : 10 for solu-salvarsan and 1 : 2 for neosalvarsan. In the case of rabbit-syphilis the drugs are equally active.

The last part of the paper records a large number of prophylactic experiments made with solu-salvarsan and neosalvarsan. Mice were given various doses of one or other of the two drugs, and then at daily intervals afterwards a certain number were inoculated with nagana. The length of protection conferred was about the same in each case and varied directly with the amount of drug given. When the dose approximated to the maximum tolerated dose the mice were protected for about 5 days.

W. Y.

YORKE (Warrington). Contribution au côté biologique de la chimiothérapie. [Contribution to the Biological Side of Chemotherapy.] —*Riv. di Malarologia*. Sez. II. 1935. Vol. 14. Supp. to No. 3. pp. 53-71. With 3 graphs.

In this lecture the author summarized the recent work of his colleagues and himself. The various matters dealt with have already been noticed in this *Bulletin*.

W. Y.

BROWNING (C. H.). Chemotherapy—the Progress of Thirty Years and the Prospect.—*Glasgow Med. Jl.* 1935. Nov. Vol. 124. No. 5. Chir. pp. 1-16.

This lecture gives a general review of the progress of chemotherapy during the last 30 years. It contains nothing new and must be consulted in the original by those interested.

W. Y.

SCHILLING (Claus) with H. SCHRECK, H. NEUMANN & H. KUNERT. Versuche zur Schutzimpfung gegen Tsetsekrankheit. II. Teil. [Experiments on Protective Inoculation against Tsetse-fly Disease.] —*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1935. Aug. 30. Vol. 85. No. 5/6. pp. 513-528.

The work with which this paper deals has already been published elsewhere and noticed in this *Bulletin* [1935, Vol. 32, p. 714].

W. Y.

DUKE (H. Lyndhurst). Old "Laboratory" Strains of the Polymorphic Trypanosomes.—*Lancet*. 1935. Sept. 21. pp. 665-667.

This paper is apparently called forth by Browning and Gulbransen's recent communication regarding a strain of *T. brucei* passaged in mice. In the early passages the infection was relatively chronic and relatively resistant to arsenicals, whilst in the later passages it was relatively virulent and the infected mice were readily cured by the same drugs. [This general fact has, of course, been known for many years by all who have interested themselves in experimental chemotherapy. For example, *T. rhodesiense* infections in man are notoriously resistant to arsenical treatment, and the reviewer and his colleagues showed some years ago that freshly isolated strains of *T. rhodesiense* and *T. brucei* in laboratory animals were highly resistant to arsenicals, whereas infections by old laboratory strains of *T. rhodesiense* were readily curable.]

Duke points out that among the changes which may occur in trypanosomes during prolonged maintenance by direct passage in laboratory rodents are: (1) loss of power to develop in tsetse; and (2) increase of virulence; a third character which may also change is pathogenicity to man.

Once a strain has lost its power to develop in tsetse it retains for the student of human trypanosomiasis an interest mainly academic. Many old laboratory strains are now in all probability unable to develop in *Glossina*. This subject has been ignored by most investigators, although REICHENOW [this *Bulletin*, 1935, Vol. 32, p. 34] has studied what appears to be a closely associated if not identical character, *viz.* the culturability of these organisms in artificial media. Probably TAYLOR encountered one or two non-transmissible strains in his work in Nigeria [this *Bulletin*, 1933, Vol. 30, p. 105]. In his introductory remarks TAYLOR refers to Duke's views as follows:—"If this total loss of transmissibility occurs in nature with any frequency, and Duke's analysis of East African *T. gambiense* strains suggests this, then it would seem that *T. gambiense* strains are constantly becoming extinct, a conclusion of very considerable importance from the epidemiological standpoint." Duke states that his own experience of naturally occurring non-transmissible strains has been derived entirely from *T. gambiense* regions where *G. palpalis* is the only tsetse. Even here they were exceptional; and he has met with only one non-transmissible "wild" strain of *T. brucei* and none of *T. rhodesiense* in its typical form virulent to man.

The second modification, increase of virulence, may occur in nature. It is possible that direct transmission by *Glossina* plays an accessory part in the spread of the *brucei* group in nature, in the form of epidemics in man or domestic animals. But this must be incidental to the normal propagation of these trypanosomes. In nature increasing virulence for a vertebrate host is actually an embarrassment to a trypanosome, and yet in the laboratory there is a tendency to regard it rather as a kind of adaptation of the parasite to its host [and undoubtedly it is]. Duke complains that an enormous amount of work has been done in European laboratories during the last 20 to 30 years with trypanosomes which have little resemblance to their ancestors fresh from human or ruminant blood.

Laboratory changes and trypanocidal drugs.—A field biologist may well look askance at the majority of the representatives of *T. gambiense*

or *T. brucei* in European laboratories. Increased virulence is a common result of prolonged maintenance of a trypanosome in rats or mice, and there is also evidence that the guineapig in course of time exerts a definite influence upon these organisms. Recently Duke has found that pathogenicity to man and transmissibility by tsetse may diminish apparently to vanishing point on maintenance of a strain in guineapigs.

It is interesting to determine how long old laboratory strains retain their power to infect man, but the interest is mainly academic, because such strains may in the meantime have lost their power to infect tsetse. For instance, a strain of *T. gambiense* isolated from man in 1920 was still infective for man on subcutaneous inoculation in 1935, but it was completely non-transmissible by tsetse.

It is easy to make an old laboratory strain of say *T. brucei* resistant to drugs, and this resistance, as has been shown by YORKE and his colleagues, is not diminished by cyclical passage through *Glossina*. Certain strains of *T. gambiense*, on first isolation from man possess a considerable resistance to arsenic; this may be a natural feature of the strains or the result of previous exposure to arsenicals. One attempt in Nigeria and one in Uganda to make a really sensitive strain of *T. gambiense* arsenic-resistant have resulted in a serious impairment of transmissibility. If this proves to be a general fact, then the development of drug-resistance in an ordinary arsenic-sensitive *T. gambiense* has no practical significance. [Much more work is, however, required on this important subject before we should be justified in accepting this hypothesis, which seems out of harmony with many observations.] Duke admits, however, that there is no denying the danger of producing strains resistant to arsenic by improper treatment of natives suffering from trypanosomiasis in *G. palpalis* and *G. tachinoides* areas. In practice this danger can be met by combining arsenic treatment with Bayer 205, or possibly by replacing arsenicals altogether by Bayer 205.

The author contends that the moral behind all these reflections is "to abandon the study in laboratories the world over of ancient and atypical laboratory strains of the tsetse-carried trypanosomes, and take up in their place samples recently isolated from their natural habitat. Study these until they start degenerating and then scrap them, and so build up a first-hand knowledge of the trypanosomes as they really are in nature. . . . One result will be fewer disappointments over the claims made for new trypanocidal drugs, when the time comes to test them out in real life."

[The reviewer who has had great experience during the last 8 years in examining the trypanocidal activity of new compounds is quite unable to subscribe to this doctrine. Most of those who are engaged in this work are well aware that it by no means follows that because a drug will cure laboratory animals infected with one or other of the old laboratory strains, it will necessarily cure a naturally infected human being or a domesticated animal. But we have the great advantage of knowing that if we fail to cure our laboratory animal infected with our old laboratory strain the drug is not likely to be of any use in the field. The old laboratory strains are virulent for small laboratory animals and have for the most part reached a uniform degree of sensitiveness to drugs. They are therefore very valuable as a sort of common indicator for the preliminary sorting of new potential trypanocidal substances. There are a number of weighty objections to the course recommended by Duke. To mention two

of them : Duke himself states in the present article that natural strains even of the same trypanosome vary amongst themselves in their sensitiveness to drugs at the time of isolation. As the reviewer and his colleagues have shown, some of these strains are so resistant to such well-tried drugs as tryparsamide or orsanine that they would be quite useless as indicators for testing new compounds, whilst others exhibit intermediate degrees of resistance. A second objection to the use of freshly isolated strains for this work is that such strains frequently run a chronic course in laboratory animals and are for this reason less well adapted for examination of the trypanocidal activity of new compounds. Finally, we must not forget that such well-tried trypanocidal substances as atoxyl, tryparsamide, orsanine and Bayer 205 all owe their discovery to work on old laboratory strains of trypanosomes.

If there be "disappointments over the claims made for new trypanocidal drugs," they do not result from the method of conducting the preliminary tests of new compounds on small animals infected with old laboratory strains, but from the ignorance of those who are neither able to distinguish between a mouse and a man, nor to appreciate the fact that trypanosome strains change during prolonged syringe passage through laboratory animals.] W. Y.

TOKURA (N.). Ueber Trypanotoxin von *Trypanosoma gambiense* und *equiperdum*. [Trypanotoxin of *T. gambiense* and *T. equiperdum*.]—Reprinted from *Igaku Kenkyu*. 1935. June. Vol. 9. No. 6. 14 pp. With 6 coloured figs. on 1 plate. [10 refs.]

A method of preparing trypanotoxin is described, and the effect of this upon the cornea of rabbits is examined.

In his introduction the author briefly reviews the earlier work on the subject of toxin formation by trypanosomes. The method used in the present work for preparing trypanotoxin was based upon Besredka's method of extracting endotoxins from bacteria. The blood of mice at the height of infection was collected in 2 per cent. sodium citrate solution and the trypanosomes were separated from the red corpuscles by fractional centrifugation. The trypanosomes were then collected in a narrow graduated centrifuge tube and centrifuged for 20 minutes at 3,000 revolutions in order to measure their volume. The deposit was then taken up in physiological saline and centrifuged in large centrifuge tubes and at high speed, and the supernatant fluid removed. To the deposit sodium chloride was added in the proportion of 0.1 gm. to each 0.2 cc. of trypanosomes and the mixture ground up with a sterile glass rod, distilled water being added drop by drop up to 100 times the amount of sodium chloride used. The final result of this was an emulsion consisting of 2 per cent. of trypanosomes in 1 per cent. of sodium chloride solution. This was divided into two parts, viz.—(A) which was allowed to stand for 2 hours at 37°C., and (B) which was heated at 60°C. for half an hour; both were stored in the ice-chest for 24 hours. The emulsions were then centrifuged at high speed and the supernatant fluids (trypanotoxin) removed. Preliminary trials with these two specimens of trypanotoxin showed that the latter (*i.e.* the one heated to 60°C. for 30 mins.) was considerably the more potent, and consequently it was the one used in all the work described in this paper.

The test was performed in the following manner. Rabbits were firmly fixed and a 5 per cent. solution of cocaine dropped into the eye; the globe was then fixed with hooked forceps and 0.1 cc. of trypanotoxin—either the original solution or various dilutions thereof—injected with a very fine needle into the cornea. A circumscribed, sharply delimited, whitish, opaque, definite swelling resulted. This swelling should within a few hours be completely absorbed. In order to examine the reaction a fluorescent solution (fluoresceine 0.5, sod. bicarb. 1.5, dist. water 100) should be dropped in the eye on the following day and each day afterwards for a week. If there is any ulcer of the cornea, the ulcerated region will appear more or less strongly green or yellow.

The following degrees of reaction were noted :—

1. Typical ulcer formation. Deep green to dirty yellow colour; edge more or less definitely undermined; conjunctiva hyperaemic and cornea cloudy; haemorrhage in the anterior chamber; later staphyloma formation. Healing occurs in 10 to 18 days, leaving a white area.

2. Moderate ulcer formation. Deep green to dirty yellow colour, edge slightly undermined; no staphyloma. Healing in 6 to 9 days leaving a white area.

3. Slight ulcer formation. Round sharply limited, light green colour; surface slightly rough. Heals in 2 to 5 days with hardly a trace.

The experiments are described in some detail and the results are summarized in tables. The following summary is given :—

1. *T. gambiense* and *T. equiperdum* produce a trypanotoxin which will produce circumscribed ulcers in the cornea of rabbits.

2. Trypanotoxin withstands heating to 60°C. for 30 mins., but is completely destroyed by a temperature of 80°C. for 30 mins.

3. It is also destroyed by N/5 NaOH and by N/5 HCl solutions.

4. It loses its activity when exposed to direct sunlight for 2½ hours or to ultraviolet rays for 1½ hours.

5. It retains its potency when dried for at least 20 days.

6. The cornea of a rabbit immunized with *gambiense* or *equiperdum* formalized vaccines is less susceptible to the corresponding trypanotoxin. Similarly the reaction is modified if the rabbit is given a dose of the corresponding antitrypanosomal serum, but not if a heterologous antitrypanosomal serum is administered.

In an appendix the author remarks that he was unable to obtain any reaction in the skin of rabbits with trypanotoxin when injected in amounts varying from 0.1 to 0.25 cc. He therefore conceived the idea of examining the Shwartzman's phenomenon with trypanotoxin. Eight rabbits were prepared by an intracutaneous injection into the shaved skin of the abdomen of 0.25 cc. of *gambiense*- and *equiperdum*-trypanotoxin and of typhus toxin, each toxin being given in two places. After 24 hours 2 of the rabbits were given an injection of 2.5 cc. of *gambiense* trypanotoxin, 2 a similar injection of *equiperdum* trypanotoxin, 2 typhus toxin, and 2 normal saline. The reactions are shown in a table. The combination typhus toxin preparation + typhus toxin injection produced a definite ecchymosis in the corresponding areas, the combination typhus toxin preparation + trypanotoxin injection gave a similar but slighter ecchymosis. There was no reaction in the areas prepared with trypanotoxin. W. Y.

KAPUSTO (M. L.). Zum Problem der direkten und indirekten Wirkung in der Chemotherapie. VII. Die Abhängigkeit des chemotherapeutischen Effekts von den antigenen Eigenschaften der Mikroorganismen. [The Problem of Direct and Indirect Action in Chemotherapy. VII. The Dependence of Chemotherapeutic Effect upon the Antigen Properties of Micro-Organisms.]—*Arch. f. Dermat. u. Syph.* 1935. Aug. 14. Vol. 171. No. 6. pp. 634–640.

In this paper Kapusto has examined the conclusion reached recently by KROĆ, viz., that there is a relationship between chemotherapeutic effect and the antigen value of the parasite, or in other words that the failure of treatment is not due alone to relative drug-resistance of the parasite, but much more to factors which are related to the capacity of the parasite to produce immunization [this *Bulletin*, 1932, Vol. 29, p. 648].

KROĆ described experiments suggesting that the relapse strain which is formed by the influence of immune body on the original strain of trypanosomes is but slightly affected by salvarsan, because the antigen immunizing power of the relapse strain is feeble.

With the idea that the correspondence between the antigen capacity of the original and relapse strains and their sensibility to salvarsan is merely fortuitous, Kapusto has repeated KROĆ's experiments except that instead of *T. brucei* (Prowazek) he chose a chronic infection (*T. gambiense*), which, under natural conditions, is associated with relapses and with the formation of relapse strains resistant to immune body. Mice infected with the original strain and with two relapse strains were cured with equal ease by salvarsan. In further experiments 9 mice were infected with the original strain of *T. gambiense* and then given a curative dose of salvarsan; 23 or 24 days later 3 of the mice were injected with the original strain, 3 with the first relapse strain, and 3 with the second relapse strain; all became infected. Another 8 mice were infected with the first relapse strain and given the same dose of salvarsan as the previous mice: after 24 or 25 days 2 were injected with the original strain, 3 with the first relapse strain and 3 with the second relapse strain; 1 of the 2 injected with the original strain became infected, 1 of the 3 injected with the first relapse strain and all of those injected with the second relapse strain. Finally, if mice were infected with the second relapse strain and then treated as the above animals, all the animals injected with each of the three strains became infected.

In contrast to the findings of KROĆ with *T. brucei* these experiments show that the antigen potency of the original and relapse strains of a chronic infection like *T. gambiense* is exactly the same.

The general conclusion reached is that KROĆ's experiments afford no support for the theory of the indirect action of salvarsan. W. Y.

GOLDIE (H.). Influence des composés de la série du moranyl sur la coagulation du sang. [The Effect of Compounds belonging to the Moranyl Series on the Coagulation of the Blood.]—*C. R. Soc. Biol.* 1935. Vol. 119. No. 27. pp. 1409–1412.

In previous papers [this *Bulletin*, 1935, Vol. 32, p. 355] the author has shown that moranyl possesses an anti-coagulatory action both *in vivo* and *in vitro*. This paper records the result of a comparative study of various compounds belonging to the same series.

When a rabbit is injected intravenously with 0.1 mgm. of moranyl its blood removed 5 mins. later remains liquid for 15 mins., and that withdrawn 20 mins. later for several hours. The blood of a rabbit removed 5 mins. after injection of inverse moranyl (isomere of moranyl) remains fluid for 30 to 60 mins., but that removed after 20 mins. coagulates rapidly. The injection of benzoyl-benzoyl (moranyl deprived of its methyl group) only slightly inhibits coagulation.

The minimum quantity of moranyl or benzoyl-benzoyl required to prevent coagulation for 6 hours of 8 cc. of horse blood is 2 cc. of a 0.5 per cent. solution, but for moranyl-inverse it is 2 cc. of a 0.0125 per cent. solution. It follows, therefore, that the compounds slightly active *in vivo* manifest *in vitro* an anti-coagulatory action equal (benzoyl-benzoyl) or superior (moranyl-inverse) to that of moranyl, which alone among the compounds produces a durable effect *in vivo*.

The addition of liquefied gelatine produces a rapid but incomplete coagulation of the plasma obtained with moranyl-inverse and a slow but complete coagulation of the plasma prepared with benzoyl-benzoyl. On the contrary, however, the plasma prepared with moranyl, or oxalated or citrated plasma, is not coagulated by gelatine.

This work suggests that the anti-coagulatory action *in vitro* of the series of compounds studied is due to their capacity to modify the structure of the proteins; whilst in their action *in vivo* a substance intervenes which is formed perhaps by modified proteins and destroyed by the tissues *in vivo* and by gelatine *in vitro* in the case of moranyl-inverse and benzoyl-benzoyl.

W. Y.

POTTIER (R.) & VAN DEN BRANDEN (F.). Contribution à l'étude toxicologique de la glyphénarsine, pharmacopée belge IV. (Tryparsamide, tryponarsyl, novatoxyl, trypotan.) [**Contribution to the Study of the Toxicology of Glyphenarsine. (Tryparsamide, Tryponarsyl, Novatoxyl, Trypotan.)**—*Bull. Soc. Path. Exot.* 1935. Oct. 9. Vol. 28. No. 8. pp. 726-731.

As a result of previous work on the toxicology of tryparsamide for rabbits, the authors suggested that for the official test the dose should be 1.0 gm. instead of 0.75 gm. as recommended by BROWN and PEARCE [this *Bulletin*, 1933, Vol. 30, p. 786, and 1934, Vol. 31, p. 207]. LAUNOY and PRIEUR, who examined the question later, came to the conclusion that 0.75 gm. per kilo. was the best dose [this *Bulletin*, 1935, Vol. 32, p. 696]. Pottier and van den Branden reply to LAUNOY and PRIEUR in the present paper. They have summarized their toxicity tests and compared them with those of LAUNOY and PRIEUR in the following table:—

Number of rabbits surviving 7 days after injection of tryparsamide.

Dose per kilo	Launoy and Prieur		Pottier and Van den Branden	
	Number of rabbits	Alive (per cent)	Number of rabbits	Survivals (per cent.)
0.75 gm.	162	75.3	557	94.6
1.00 "	308	56.8	146	88.4
1.25 "	16	25.0	447	84.2
1.50 "	18	23.0	8	71.0

Pottier and van den Branden believe that their figures justify the conclusion reached in their previous papers, *viz.*, that 1 gm. per kilo. should be the official test dose. They consider that if the smaller dose (0.75 gm.) is selected there would be a risk of passing an abnormal lot of the drug. They do not question the accuracy of the results of LAUNOY and PRIEUR, but consider the cause of the discrepancy must be looked for in local conditions, *viz.*, the race of animals, their nutrition, climatic conditions, etc.

The authors next pass to a consideration of the toxicity of tryparamide for the mouse. They point out that the chief danger to man is optic neuritis and that, whereas the main toxic symptoms exhibited by rabbits are disorders of the alimentary canal, mice exhibit nervous symptoms (dancing mice of Ehrlich). Possibly, therefore, information of much value might be obtained from tests of samples of the drug on mice. Various samples of tryparamide were selected and each was injected subcutaneously into a group of 10 mice: the dose in each case was 90 mgm. per 20 gm. of mouse. The results are shown in the following table:—

	Mortality (per cent.)	Nervous signs (per cent.)
1. Glyphenarsine normal... ..	0	10
2. " " " " " " " " " "	0	20
3. " " " " " " " " " "	0	20
4. " " " (same product) " " " "	10	40
5. Glyphenarsine spoiled in manufacture " " " "	10	60
6. Glyphenarsine made yellow by the transient action of chlorine " " " " " " " "	0	60
7. Glyphenarsine A suspect, returned after prolonged sojourn in Congo " " " " " " " "	0	100

These results suggest that possibly different specimens of tryparamide exhibit different degrees of neurotropism, and that the mouse may be a valuable test animal.

W. Y.

VAN DEN BRANDEN (F.), APPELMANS (M.) & POTTIER (R.). La toxicité du tryponurile sur le parenchyme rénal. [The Toxicity of Tryponurile on the Renal Parenchyma.].—*Ann. Soc. Belge de Méd. Trop.* 1935. June 30. Vol. 15. No. 2. pp. 225–228.

In a previous paper [this *Bulletin*, 1935, Vol. 32, p. 695] the authors have drawn attention to the renal lesions produced by tryponurile, which is a product of L'Union Chimique Belge, consisting of equal parts of tryponarsyl and urenil (hexamethylene tetramine). The present work was instituted with the object of ascertaining firstly, whether it was the tryponarsyl or the urenil, or the combination of both, which causes the damage to the kidneys; and secondly, the dose which was necessary to produce these serious lesions.

Three groups of rabbits all weighing about 2 kilos. were injected intravenously with increasing doses of tryponarsyl, urenil, and tryponurile, respectively. Eight days later the animals were killed, the kidneys fixed in 10 per cent. formalin, sections were cut in paraffin and stained with haematoxylin, eosin and safronin.

In none of the 7 rabbits which received doses of tryponarsyl, varying from 0.05 gm. to 1.25 gm. per kilo., were any renal lesions discovered. In the 5 rabbits which were given doses of urenil, varying from 0.05 gm. to 0.75 gm. per kilo., discrete lesions were found in the renal parenchyma and certain glomeruli were congested. In the 3 rabbits which received

small doses of trypanurile, *i.e.*, 0.1 gm. to 0.5 gm. per kilo., practically no lesions were found; but in the two animals which were given larger doses, *viz.*, 1.0 gm. and 1.5 gm. of urenil per kilo., widely disseminated grave lesions were seen.

The general conclusion is that while it is not possible to say that a dose of 0.5 gm. of urenil is harmless, it is clear that a dose of 1.0 gm. per kilo. may produce very severe renal changes. In the treatment of human trypanosomiasis trypanurile should not be given in larger doses than 3 gm. to 4 gm., at any rate to commence with. W. Y.

BOURGUIGNON (G. C.). Note documentaire au sujet des trypanosomiasés animales. [**Documentary Note on the Subject of Animal Trypanosomiasis.**]*—Bull. Méd. du Katanga.* 1935. Vol. 12. No. 3. pp. 109, 111–123, 125–132.

A general article dealing with the trypanosomes which infect the domesticated animals. It contains nothing new and requires no special notice here. W. Y.

LAUNOY (L.). Suite à l'étude clinique et à celle du traitement de l'infection expérimentale du chat, du lapin et du cobaye, par *Tr. Annamense*. [**Clinical and Therapeutic Studies on Experimental Infections of the Cat, Rabbit and Guinea-pig with *T. annamense*.**]*—Bull. Soc. Path. Exot.* 1935. Nov. 13. Vol. 28. No. 9. pp. 817–823.

From the work described in the present and a previous paper (1934), it appears that occasionally *T. annamense* infections of the cat can be cured with a single dose of 2 cgm. per kilo. of moranyl. Cure can usually be obtained with two injections of 3 cgm., but even 3 injections (3 cgm.+3 cgm.+5 cgm.) sometimes fail. Attempts to cure infected rabbits with tryparsamide (0.15 gm. to 0.5 gm. per kilo.) were not successful. In guinea-pigs cure was regularly obtained with doses of 40 cgm. per kilo. of tryparsamide.

A number of therapeutic experiments were carried out on infected guinea-pigs with the substance, m.amino-p.oxyphenyl-arsino-di-thiomalate of sodium. This trivalent arsenical compound is prepared by Gailliot and contains 11.64 per cent. of arsenic. The toxic dose for guinea-pigs is between 8 and 10 mgm. per 100 gm. of body weight. It was found that a dose of 5 mgm. per 100 gm. sufficed to cure guinea-pigs infected with *T. annamense*. W. Y.

LAUNOY (L.), PRIEUR (M.) & ANCELOT (A.). Préparation et étude d'une souche de *Trypanosoma Annamense* rendue arséno-résistante. [**Preparation and Study of an Arsenic-resistant Strain of *T. annamense*.**]*—Bull. Soc. Path. Exot.* 1935. Nov. 13. Vol. 28. No. 9. pp. 857–866.

Details are given of the production of an arsenic-resistant strain of *T. annamense* by the usual method of giving repeated sub-curative doses of tryparsamide to an infected guinea-pig. In this manner a strain was easily produced which resisted the maximum dose of 15 cgm. of tryparsamide per 100 gm.; the curative dose for the normal strain is 4 cgm. per kilo. Experiments showed that this strain, which had

been made resistant to tryparsamide in the guineapig, was resistant to a trivalent arsenical, and that the resistance was maintained when the strain was passed into mice. [As the authors remark in their general conclusions, this work confirms for *T. annamense* some of the observations made by the reviewer and his colleagues with *T. rhodesiense*.]

W. Y.

- V. JANCsó (N.) & V. JANCsó (H.). Chemotherapeutische Wirkung und Kohlehydratstoffwechsel. Die Heilwirkung von Guanidin-derivaten auf die Trypanosomeninfektion. [**Chemotherapeutic Action and Carbohydrate Metabolism. The Curative Action of Guanidin Derivatives on Trypanosome Infections.**—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1935. Oct. 3. Vol. 86. No. 1/2. pp. 1-30. With 5 figs. [41 refs.]]

Previous work having suggested that there was a relationship between the carbohydrate metabolism of trypanosomes and their susceptibility to chemotherapeutic substances [this *Bulletin*, 1935, Vol. 32, p. 702], the authors decided to follow up this idea by examining the influence on experimental trypanosomiasis in the mouse of the guanidin derivatives which give rise to hypoglycaemia. It was thought that if the curative action of germanin really depended upon an interference with the carbohydrate metabolism of the trypanosomes, then it was possible that substances which were well known to affect sugar metabolism might prove to exercise a definite chemotherapeutic action.

The guanidin derivatives used were synthalin, synthalin B, monoguanid and thioguanid. The experiments were performed on white mice infected with various strains of *T. brucei*, viz., (1) An arsenic-fast variety of nagana "ferox," (2) a normal strain of nagana "Prowazek," and (3) a germanin-fast strain prepared from Strain I.

It was found that synthalin acted most powerfully on Strains 1 and 3; in these cases cures could be obtained, whereas with the normal "Prowazek" Strain 2, as a rule, only a prolongation of the infection was obtained. This is very interesting because Strain 2 infections are readily curable by many chemotherapeutic substances, whereas Strain 1 is not only resistant to all arsenicals, but also to acridin and styryl-quinolin-derivatives, and Strain 3 is in addition also resistant to germanin. The results of a number of experiments, which are summarized in tables, show that whilst the derivative synthalin exercises a curative action, the other derivatives have a comparatively feeble action.

Experiments were next undertaken to determine whether blocking of the reticulo-endothelial system (splenectomy+electro-colloidal copper) influences the action of synthalin. The results, which are given in a table, show that, whereas the normal mice infected with the arsenic-fast strain were all cured, the infections in the "blocked" animals were as a rule uninfluenced. The explanation given for this phenomenon is that the parasites are opsonized by the synthalin, and in the normal animals the opsonized parasites are removed from the circulation in masses by the phagocytes of the reticulo-endothelial system. This active removal of the weakened parasites from the circulation is one of the most powerful factors in the curative action of germanin and synthalin. Elimination of the phagocytes prevents the drugs from exercising their curative action.

Morphological studies in "blocked" animals showed that synthalin produces the same changes in the trypanosomes as germanin does; these are:—

- (a) A slow cyclical degeneration of the flagellates.
- (b) Fundamental morphological changes similar to those produced by germanin: firstly, an unusually large number of two nuclear division forms; then the characteristic micro- and macro-trypanosomes, and multinucleate giant forms, and finally bizarre degeneration and disintegrating forms.

The authors believe that synthalin acts directly, and that the continuous hypoglycaemia which it produces causes a sugar blockade of the parasites' metabolism. W. Y.

KLIGLER (I. J.) & COMAROFF (R.). **The Course of a Trypanosome Infection in Irradiated Rats.**—*Amer. Jl. Hyg.* 1935. July. Vol. 22. No. 1. pp. 11–17.

Experiments are described which suggest that daily exposure of rats for short intervals to direct solar irradiation fails to influence their resistance to trypanosome infection.

One group of rats was kept in an ordinary room in the animal house, another group in a dark room at the same temperature, and a third group in a dark incubator maintained at 29°–30°C. After acclimatization for 7 to 10 days the animals were exposed to direct solar irradiation. The exposure was made daily for 10 to 15 minutes between 11 a.m. and 1 p.m. over a period of 7 to 14 days. The rats were then infected and the daily exposure continued until death occurred. The effect of the irradiation was gauged by the duration of life after infection as compared with non-irradiated control groups kept under the same conditions.

The results of the experiments which continued over a period of two years and included 620 rats are given in tables. It appears that irradiation did not materially affect the resistance of the animals. W. Y.

RAFFEL (Sidney). **The Influence of Diphtheria Toxin on the Infection with *Trypanosoma equiperdum* in the Rat.**—*Amer. Jl. Hyg.* 1935. Sept. Vol. 22. No. 2. pp. 339–363. With 3 figs. & 1 graph. [45 refs.]

Consideration of the biological properties of the diphtheria toxin suggested that an investigation of the possible parasitocidal activity of this substance in a trypanosome infection of the rat might prove of interest. It was thought, for example, that there might be a direct activity of the toxin on the trypanosomes as animal cells, or alternatively that possibly the diphtheria toxin might exert some action on the protective elements of the host.

Albino rats were used in these experiments and were infected with a virulent strain of *T. equiperdum* by intraperitoneal injection of blood of passage mice. The diphtheria toxin employed was unusually potent containing 1,200 guineapig M.L.D. per cc. A second toxin, of which the L+dose was 0.2 cc., was used for purposes of confirmation. As a control for the activity of the toxin, this substance was heated to 70°C. for 45 minutes: according to RAMON (1923) such treatment destroys all toxic as well as anatoxic properties of diphtheria toxin. The elimination of toxicity by this method was confirmed by injection of large amounts into guineapigs.

The experiments are divided into two groups, the first dealing with the effect of the toxin *in vivo* and the second with its action *in vitro*. The technique used in the latter class of experiments was that devised by the reviewer and his colleagues (1929).

The following are the conclusions :—

" 1. The injection of diphtheria toxin into rats infected with *Trypanosoma equiperdum* modifies the course of the infection. When it is injected intraperitoneally at about the time of infection, its influence is manifested as a prolongation of the incubation period, and in two instances, animals treated in this manner were freed of the infection. When injected intravascularly during the period of blood invasion, there is a marked decrease in the numbers of parasites in the blood and a subsequent "pseudo-relapse" in which the increasing trypanosomes are of a serologically unaltered character.

" 2. The parasitocidal activity of the toxin *in vitro* is, so far as can be judged, much less marked than that of the pentavalent arsenicals or the *B. subtilis* "trypanotoxin" described by Levaditi and Twort, and is very far below that of the trivalent and arsenobenzol types of arsenic compounds.

" 3. The results obtained in the infected animals appear incompatible with those observed *in vitro*. However, the evidence does not warrant the conclusion that the activity *in vivo* is partially the result of an auxiliary process, the immunity mechanism of the host. The fact that the immune response does not regularly take part here as with the use of the chemotherapeutic substances may be explained on the basis of the general lowering of the condition of the host and the specific lesions in certain of the reticulo-endothelial tissues which large doses of toxin occasion in the rat.

" 4. The toxin does not decrease the infectivity of trypanosomes exposed to it. Neither does prolonged contact with this substance induce a resistance of the parasites to it, nor a change in their serological character."

W. Y.

ASCIONE (Guglielmo) & DI BELLO (Giovanni). A proposito dell' antagonismo fra tubercolosi e tripanosomiasi. Ricerche eseguite col B.C.G. ed il *Trypanosoma brucei*. [The Supposed Antagonism between Tuberculosis and Trypanosomiasis. A Study of BCG and Nagana.]—*Giorn. di Batteriol. e Immunol.* 1935. May. Vol. 14. No. 5. pp. 1073-1078. English summary (4 lines).

In 1914 ORSI stated that an antagonism existed between the human type of *Mycobacterium tuberculosis* and Nagana. He recorded that guineapigs infected with the trypanosome lost the infection when inoculated with the tubercle bacillus, and *vice versa* that guineapigs infected with tuberculosis did not sicken with trypanosomiasis when inoculated with the blood of animals containing the trypanosome.

The authors made three series of experiments using Nagana trypanosome and BCG. The strain of trypanosome was virulent, killing in 7-15 days, average 11 days. In the first series 18 guineapigs were used, 6 being inoculated with trypanosomes (one drop of blood from the ear of an infected guineapig was diluted to 1 cc. with physiological saline) intraperitoneally on the 10th, 12th and 14th August 1934. On the 16th two of each group were injected with 0.5 cgm. BCG subcutaneously another two intraperitoneally and six were kept as controls. They all died in 7-14 days, showing that here at least there was no antagonism.

In the second investigation 3 guineapigs were inoculated simultaneously with trypanosomes and 0.5 cgm. BCG subcutaneously, 3

intraperitoneally and 3 with trypanosomes only as controls. All died in 7-15 days. The simultaneous infection with both does not, therefore, give any signs of antagonism.

In the third series 5 guineapigs were given 1 cgm. of BCG subcutaneously and 5 had 0.5 cgm. intraperitoneally. A month later these 10 and three others for control were inoculated with the trypanosomes. All died between 7 and 13 days after the trypanosome injection. In other words, no indications could be observed of any protection afforded by BCG against infection by Nagana, contrary to what ORSI had found as regards the virulent human type of *Myco. tuberculosis* [see *Bulletin of Sleeping Sickness Bureau*, 1910, Vol. 2, p. 205]. H. H. S.

DUKE (H. Lyndhurst). **A Note on the Behaviour of Baboon and Monitor Blood in Tsetse Flies.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. July 31. Vol. 29. No. 2. pp. 207-209.

In the intestinal contents of *G. palpalis* which has fed on the baboon, *Papio tessellatus*, large masses of light green coloured crystals are found. The crystals persist for some days after the meal on the baboon. Two main types are found: long cylindrical crystals shaped like a whetstone or a needle, and a shorter form resembling Charcot-Leyden crystals, but round or oval in cross section. In flies fed on the monitor lizard (*Varanus ocellatus*) similar crystals are seen. No attempt has been made to study the crystals beyond the observation that they are soluble in ether. Duke concludes "It is remarkable that the two animals whose blood is richest in the substance responsible for these curious deposits are to all intents and purposes completely resistant to infection with the polymorphic trypanosomes by any normal route."

W. Y.

ROUBAUD (Émile) & TREILLARD (Marc). Un coccobacille pathogène pour les mouches tsétsés. [**A Cocco-bacillus Pathogenic to Tsetse.**]—*C. R. Acad. Sci.* 1935. July 22. Vol. 201. No. 4. pp. 304-306.

Pupae of *Glossina morsitans* were received in France by air mail, and though the adults emerged they died very quickly. Two were examined, and from one of them the authors isolated a cocco-bacillus, of which they here describe the principal cultural characteristics. They have difficulty in thinking how the organism could have gained entrance to the body of the fly, for which they feel sure it is pathogenic, but they do not discuss the possibility that the fly died of some quite different cause and that their organism is a post-mortem contamination.

P. A. Buxton.

MAZZA (Salvador), GERMINAL & BASSO (Redento). Primer caso agudo de enfermedad de Chagas y primeros animales domésticos (perro, gato), portadores de *Schizotrypanum cruzi* comprobados en la provincia de Mendoza. [**First Case of Chagas's Disease reported in the Province of Mendoza.**]—*Universidad Buenos Aires: Misión de Estudios de Patología Regional Argentina Jujuy.* 1935. Publicación No. 24. pp. 3-16. With 6 figs. (3 maps).

The patient was a girl, 9 months of age, who two months previously had suffered from fever to 38-39°C., diarrhoea and vomiting, continuous sideways movement of the head and clonic contractions of the

right leg. The convulsive movements cleared up in a few days, but fever, diarrhoea and "meningeal irritation" continued. The face was noticed to be asymmetrical due to oedema of the left temporo-malar region and eyelids, with congestion and oedema of the palpebral conjunctiva. There was no thyroid enlargement. *Trypanosoma cruzi*, in small numbers, was seen on examination of blood. *Triatoma infestans* in the nymph stage were found infested in the dwelling, and dogs and cats in the houses of the district were found also to be infested. The presence of the parasite in the armadillo *Zaedyus pichy caurinus* had already been demonstrated by Dr. Mazza. H. H. S.

MAZZA (Salvador) & GOVI (Luis). Caso agudo de enfermedad de Chagas clínicamente denunciado en el Chaco por conjuntivitis esquizotripanósica unilateral. [**Chagas's Disease. An Acute Case in el Chaco.**]*—Universidad Buenos Aires. Misión de Estudios de Patología Regional Argentina Jujuy.* 1935. Publicación No 24. pp. 19-27. With 8 figs. (1 map).

ROMAÑA has recorded unilateral conjunctivitis with oedema as an early sign of infection by *T. cruzi* and had, in fact, based on this the hypothesis that the conjunctiva may be a portal of entry. In the case recorded here the unilateral ocular condition directed attention to the possible trypanosomal nature of the disease. When examined, the patient, a child of 4 years, presented the appearance shown in the accompanying illustration. His temperature ranged to 40°C with



Unilateral conjunctivitis with oedema as an early sign of infection by *Trypanosoma cruzi*.

[Reproduced from Publicación No 24, *Universidad Buenos Aires: Misión de Estudios de Patología Regional Argentina Jujuy.*]

morning remissions. Blood in smear revealed no trypanosomes, but they were seen in a thick drop preparation and the differential leucocyte count gave neutrophils 38·6, lymphocytes 45·0, monocytes 15, eosinophiles 1·3. The liver extended 2 fingers'-breadths below the costal border, the spleen was just palpable. During the next week the oedema of the eyelids increased till the palpebral fissure was obliterated and the preauricular gland was enlarged. The log-hut in which the family dwelt was very heavily infested with *Triatoma infestans*. In one day's capture two nymphs and two adults were found with many metacyclic trypanosomes.

The patient was given sulpharsenol, starting with 0·06 gm., then at 4-day intervals 0·06, 0·12, 0·12, 0·12, 0·18, 0·18 gm., by which time the fever and oedema had disappeared. Trypanosomes could no longer be seen, but the liver remained enlarged, now 3 fingers'-breadths below the rib border. The differential leucocyte count was : neutrophils 19·9, eosinophiles 4, basophiles 0·3, lymphocytes 61·3, large mononuclears 14·3 per cent.

H. H. S.

MAZZA (Salvador) & NASTRI DE FISCHER (Carolina). Investigaciones sobre la enfermedad de Chagas. II. Primeras comprobaciones de casos de enfermedad de Chagas en San Juan. [**First Proved Human Cases of Infection with *T. cruzi* in San Juan.**]*—Universidad Buenos Aires : Misión de Estudios de Patología Regional Argentina Jujuy.* 1935. Publicación No. 25. pp. 12–18. With 3 figs.

Two cases are detailed, both showing acute symptoms ; one was a girl of 6 years and the other of 11 months of age. In the first the course of the disease was mild ; the second died, " cause unknown," 6–7 weeks after the trypanosome infection had been discovered. One lived in San Juan itself, the other just outside. These are said to be the first human cases to be seen or recorded in the Province.

H. H. S.

CÁCERES (Romeo) & IZAGUIRRE (Abelardo). Investigaciones sobre la enfermedad de Chagas. III. Primer caso de forma aguda de enfermedad de Chagas, determinado en la provincia de Entre Ríos y Litoral argentino. [**A Case of Acute Chagas's Disease in the Province of Entre Ríos.**]*—Universidad Buenos Aires : Misión de Estudios de Patología Regional Argentina Jujuy.* 1935. Publicación No. 25. pp. 18–25. With 3 figs.

The patient was a boy, 5 years old. He presented the symptom which has been referred to before [see this *Bulletin*, 1935, Vol. 32, p. 717], as an early sign, *viz.*, localized oedema of the eyelids, malar and temporal regions, in this case the right side. Examination of blood smears revealed the trypanosome and animal inoculation gave positive results. Carotid and supraclavicular glands were enlarged, but not the thyroid. He was given "Paroxyl," a quarter of a tablet twice daily.

This is claimed to be the first case found in the Province of Entre Ríos. [Existence of these cases is gradually being determined in one Province after another ; it is possible that it is present more or less all over the Argentine.]

H. H. S.

MINNING (Waldemar). Zur Spezifität der Komplement-Bindungs-Reaktion bei der amerikanischen Trypanosomiasis (Chagas-Krankheit). [The Specificity of the Complement-binding Reaction in Chagas's Disease.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1935. Aug. Vol. 39. No. 8. pp. 315–328.

With the object of ascertaining the significance of the Machado reaction for the diagnosis of Chagas's disease, the author has employed the test with the sera from about 200 patients suffering from other diseases; he has also followed the reaction throughout the course of *T. cruzi* infections in dogs.

A detailed account is given of the technique used in preparing the antigen; this was made from the organs of young dogs which were infected when they were about 12 days old. The dogs, which were severely affected, were killed from 4 to 8 weeks after infection; the organ selected was ground up with sand, and to one part by weight were added 1 part of glycerine and 2 of water, and carbolic acid to the extent of 0.5 per cent. The extract was frequently shaken and kept at laboratory temperature for 5 days and was then filtered through gauze to remove the larger particles. The material was stored in the ice-chest. Guineapig serum, titrated in the usual manner, served as complement. The haemolytic system consisted of 1 cc. of 5 per cent. sheep's corpuscles in 0.9 per cent. saline in combination with titrated amboceptor (1 : 1,000–1 : 1,500).

It was found that in man the reaction was not specific, as the sera of syphilitics, pregnant women, of women just after child-birth, of cases of pernicious anaemia, of hyperthyroidism and of worm infections gave a positive reaction in a high percentage of instances.

In a splenectomized dog the reaction was positive when parasites first appeared in the blood on the 9th day after infection, whilst in another non-splenectomized dog the reaction was not positive until later in the infection. It appears that during the course of the disease in dogs the reaction varies in a rhythmical manner, waxing and waning from time to time; a positive reaction was observed as late as the 349th day of the disease in one animal. It is noted that the Wassermann reaction was always positive when the Machado-reaction was positive.

W. Y.

NIIMI (S.). Studies on Experimental Chagas Disease.—*Japanese Jl. Experim. Med.* 1935. Aug. 10. Vol. 13. No. 4. pp. 543–564. With 6 coloured figs. on 1 plate. [21 refs.]

This paper describes researches undertaken with the object of investigating the cause of anaemia in Chagas's disease.

The strain of trypanosomes used in this work was brought from Brazil in 1932, and has been maintained by passage through mice. In the later passages it was found that the incubation period was shortened. The younger the animals the more serious was the disease. The infection in splenectomized rats did not differ from that in normal animals.

The blood changes were studied in infected young rabbits fed on a standard diet. The red cell count gradually fell; in 1 to 2 weeks it had decreased by about a million, and by the 7th week it had fallen by three millions by which time the animals were moribund. The haemoglobin value fell *pari passu* with the red cell count. The reticulocytes

increased at first, but decreased in number in the final stages of the disease. Polychromatophilic erythrocytes increase during the anaemia, but decrease remarkably at the end of the disease. Nucleated red cells, Howell-Jolly's corpuscles and poikilocytes are not very numerous, and thrombocytes decrease to a marked extent. Leucocytes at first increase and then gradually decrease in number; in the final stages there is a definite leucopenia. The haematopoietic organs were examined and showed histological changes quite in accord with these changes in the blood.

In the second portion of his paper the author considers the cause of these blood changes seen in *T. cruzi* infections. He cultivated the parasite on a medium consisting of equal parts of 2 per cent. broth-agar and of defibrinated horse blood. After allowing the parasites to grow for 20 days at 23–25°C., the condensation fluid was removed, centrifuged, and then filtered through a Chamberland L₅ filter in order to free it completely of trypanosomes. If this fluid is inoculated intravenously in a dose of about 2.0 cc. daily, all the blood changes noted above are produced. Inoculation of the trypanosomes themselves, freed from medium by washing in saline and killed by heating to 56°C. for 30 mins., failed to produce any anaemia.

In order to ascertain whether the culture fluid in the trypanosome bodies was possessed of antigenic properties, rabbits were immunized with repeated injections of each of these substances. They were then tested by intravenous injection of large doses of culture fluid. It was found that the animals which had previously received the small doses of culture fluid were protected against the harmful effect of the large doses, whereas those which had had the trypanosomes were rendered anaemic by the subsequent injection of culture fluid in just the same way as normal animals. Apparently, therefore, filtered culture fluid is possessed of antigenic properties, whilst the trypanosome bodies do not contain these substances.

W. Y.

MAZZA (Salvador) & DRIOLLET (E.). Investigaciones sobre la enfermedad de Chagas. I. Comprobación de otra especie de armadillo en San Juan con infección natural por *Schizotrypanum cruzi*. [Another Species of Armadillo found Naturally Infected by *T. cruzi*.] —Universidad Buenos Aires: Misión de Estudios de Patología Regional Argentina Jujuy. 1935. Publicación No. 25. pp. 3–11. With 11 figs.

The authors examined six specimens of *Chaetophractus vellerosus pannosus* Thos. in Cochagual, which is 60 kilometres south of San Juan, Sarmiento Province, and found them heavily infected with *T. cruzi*, the leishmanial forms being abundant in the heart and the striped muscles. This makes four species found naturally infected in the Argentine, the others being *C. vellerosus vellerosus*, *Dasybus novemcinctus* and *Zaedyus pichy caurinus* [see this *Bulletin*, 1935, Vol. 32, p. 717]. H. H. S.

BONNE (C.). Over de Crithidiën van *Triatoma rubrofasciatus* de Geer. Eerste mededeeling. [On the Crithidia in *Triatoma rubrofasciatus*.] —Geneesk. Tijdschr. v. Nederl.-Indië. 1935. Aug. 20. Vol. 75. No. 17. p. 1490. With 1 plate.

Referring to the paper by MALAMOS [this *Bulletin*, Vol. 32, p. 718] recording the presence of *Trypanosoma cruzi* in monkeys from the

Dutch East Indies the author states that he has examined monkeys with negative result but has produced a trypanosome infection in mice by the inoculation of the crithidia which occur in the hind gut of *Triatoma rubrofasciatus* in Batavia. A similar observation was made long ago by LAFONT (1912) with the flagellates from this bug in Mauritius.

C. M. Wenyon.

MALARIA.

CHRISTOPHERS (S. R.). **Malaria Survey.**—*Riv. di Malariologia.* Sez. II. 1935. Vol. 14. Supp. to No. 3. pp. 87–95.

Malaria survey is of the highest importance because it is impossible to determine until the actual facts are known which measures of prevention should be adopted, or indeed if any preventive measures should be taken. The truth of this is demonstrated by several examples: the commonest anopheline in Bombay is *A. superpictus*, and this would certainly have engaged the attention of the health authorities had it not been for a malaria survey which showed that *superpictus* was harmless and that *A. stephensi*, which breeds in wells and cisterns, was the carrier. Owing to a religious tenet of the Parsees, wells must be so situated that light from the sky can reach the water. Owing to the density of population, communal houses several stories high are usual, and a type of dwelling has resulted in which the tiers of living rooms opening inwards are arranged around a central, narrow space, at the bottom of which is the open well. In other parts of the city, *A. stephensi* bred in household tanks and cisterns. In the course of years, almost all the wells in Bombay have been abolished or rendered mosquito-proof, and stringent regulations are enforced regarding the protection of cisterns. Other instances of the value of preliminary malaria survey, for example in the Punjab and the Andamans are given, and also an outline of the technique of survey work. *W. Fletcher.*

JAMES (S. P.). L'épidémie de paludisme à Ceylan en 1934–1935. [**The Ceylon Epidemic of Malaria, 1934–35.**—*Bull. Office Internat. d'Hyg. Publique.* 1935. June. Vol. 27. No. 6. pp. 1135–1140. With 1 map & 1 diagram.

The island of Ceylon lies in the Indian Ocean between 5° and 10° North of the Equator. It is about half the size of England and has a population of 5½ million. About 60 per cent. of the population inhabit the humid, fertile south-west region which is traversed by the main rivers coming down from the central hills. It is in this region that the terrible epidemic has occurred. Malaria is always prevalent in Ceylon; even in normal years, about 1½ million malaria patients are treated at the hospitals and dispensaries, and the Government spends £23,000 a year on free quinine. Though there are many species of anopheles, *A. culicifacies* is the only active carrier. Benign tertian is the commonest type of malaria and quartan comes next, malignant tertian is comparatively rare. The dry, north-eastern zone of the island is normally the most malarious; the humid, south-western province is almost free from it, and in its plains the splenic index is usually about 5 per cent. as compared with 70 per cent. in the dry zone. It had been noticed, in the past, that in dry years when the monsoon failed there was more malaria in the healthy humid zone, and, in 1934, when the south-west monsoon not only failed but was entirely absent, the authorities became alarmed and sent out warnings to the sanitary inspectors. A fortnight later, in the beginning of October, the epidemic began, and in November many of the dispensaries were treating ten times the usual number of malaria cases. By the middle of December, the epidemic reached its height; whole villages were struck down at once, roads were blocked by victims painfully making

their way to the hospitals and dispensaries and the medical department was treating 60,000 cases a day. The first wave of the epidemic declined with the new year and came to an end in March, but it was quickly followed by a second. This second wave was apparently due to recurrences, and not to fresh infections [but see GILL, below]. The vast majority of the infections were of the benign tertian type, and the production of late recurrences is characteristic of the benign tertian parasite. The case mortality, thanks to the comparative rarity of malignant tertian infections, was comparatively low; for the whole of the affected zone it was some 1.5 per cent., while it was about twice this figure at Kegalle which was the centre of the epidemic.

The primary cause of the epidemic was the complete failure of the south-west monsoon. Instead of the summer rains, there was drought from May to October. This had no effect upon the dry, north-eastern zone, which even in normal years is not reached by this monsoon, and the malaria there during 1934-5 was no worse than usual; but the effect upon the humid south-western zone was disastrous. There, the large lakes dwindled until each one became a collection of small shallow ponds, and the big rivers sank until nothing remained but a series of clear pools. The result was a veritable plague of mosquitoes; *A. culicifacies* swarmed into the houses, and spread malaria. The infection rate of mosquitoes caught in houses over the whole region was 14 per cent. The drought was not only responsible for the plague of mosquitoes, but also for a failure of the crops which brought the population to a state of poverty and malnutrition and made them readier victims. Another factor which favoured the epidemic was the absence of immunity in the south-western zone where malaria is uncommon and the people are not used to dealing with it. The author pays tribute to the central, municipal and charitable organizations for the energetic steps which they took to limit the effects of the epidemic. To have prevented it, even with unlimited funds and a very large staff, would have been an impossible task. It is one thing to control malaria in a small town or plantation, but quite a different matter to suppress mosquito breeding in thousands of pools in the beds of large rivers and their affluents, let alone those in the lakes and marshes. (See also WIGGLESWORTH, this *Bulletin*, 1935, Vol. 32, p. 732.)

W. F.

CEYLON. Sessional Paper XXIII.—1935. **Report on the Malaria Epidemic in Ceylon in 1934-35. Together with a Scheme for the Control of Malaria in the Island** [GILL (C. A.), Expert Adviser on Malaria to the Ceylon Government].—44 pp. With 7 charts, 9 maps & 11 photographs. 1935. Sept. Colombo: Govt. Record Office. [Rs.3.]

The epidemic was not due simply to excessive mosquito breeding and to poverty resulting from the drought, but to the presence of these conditions simultaneously with the presence of an X factor which occurs periodically every 5 years and is associated with the malaria parasite. [Apparently a recurring high virulence or swarming of the malaria parasite.]

Colonel C. A. Gill, I.M.S., formerly Chief Malaria Officer, Punjab, was commissioned by the Government: (1) To review the recent epidemic and to consider its probable consequences. (2) To review the anti-malaria work carried out in Ceylon during the last 12 years.

(3) To define the future policy in regard to malaria in Ceylon. (4) To formulate the scope and powers of an Anti-Mosquito Ordinance.

He arrived in Ceylon at the beginning of April, 1935, and remained for about 5 months. He has drawn up his report in two parts: the first is a general review of the epidemic, the second embodies a scheme for preventing the occurrence of epidemics in the future.

Epidemics of malaria occur in Ceylon at intervals of about 5 years, but that of 1934-5 was the greatest pestilence in the recorded history of the island and destroyed 80,000 lives in the space of 7 months. The great epidemic of 1867 in Mauritius is the only instance of an epidemic in the tropics which can compare with it. The Ceylon epidemic, so far as mortality is concerned, comprised a great primary wave which started in November 1934 and reached its height in the middle of January. It was followed by a smaller wave in May 1935 which was still declining in July. This second wave was associated with a rise in the infection rate of anopheles, and "it was therefore a true epidemic wave being due, in part, to new infections as opposed to relapses." Ceylon had been particularly healthy for some years before the epidemic; there had been a conspicuous downward trend of the death rate for 10 years and more especially for the last 5. The death rate for 1932 (20.5) was the lowest on record. The actual onset of the epidemic was preceded by an increase of out-patients at some of the dispensaries during the latter half of September; a fortnight later the same thing occurred over a wider area and, at the end of October, the epidemic began with an explosive outbreak which occurred, almost simultaneously, over an area of about 5,800 square miles. This area comprises the healthy, populous western quadrant of the island known as the "wet zone" in contradistinction to the dry zone in the north where malaria is hyperendemic (see JAMES above). Throughout this area, almost the whole of the 3 million inhabitants, already enfeebled by famine, the result of a drought caused by failure of the south-west monsoon, were suddenly overwhelmed with sickness. The epidemics of the past have occurred in the same area, and have also been associated with drought. Malaria in the dry, northern zone is, on the contrary, associated with excessive rainfall.

Colonel Gill is full of admiration for the way in which the epidemic was dealt with by the Medical Department; he writes of "the prompt and thorough manner in which it was tackled . . . the able manner in which the scheme was organized and administered by the Head of the Medical Department, and, it may be added, the splendid response made by all members of the Medical and Sanitary Departments to the heavy demands made upon them." There was never any shortage of quinine.

A. culicifacies, the anopheline carrier of Ceylon, is essentially a dry zone species, widely prevalent in the north and east of the island where malaria is hyperendemic. It is much less prevalent in the comparatively healthy wet zone. In former epidemic years it has been found spreading southwards into the wet zone and during the recent epidemic it was found in vast numbers much to the south of its normal habitat, more particularly in the neighbourhood of the rivers. Mr. H. F. CARTER, the Entomologist, has found that, in years when the monsoon is normal, these rivers do not act as breeding grounds for *A. culicifacies* because they are subject to repeated flushing, but in years of deficient monsoon rainfall, such as 1934, the

full-flowing river is replaced by a series of rocky pools which constitute a favourite breeding place of this mosquito. Observations made before and during the epidemic showed that the pools and sheets of water in the river beds contained *A. culicifacies* in prodigious numbers, and it was in their vicinity that the epidemic first appeared and subsequently attained its maximum intensity. Colonel Gill does not think that the phenomenal breeding of anopheles in the river beds was the sole factor concerned. He points out that epidemics in Ceylon and many other countries tend to recur at intervals of 5 years or multiples thereof, and he considers that periodicity plays an important part. This periodicity is presumably an attribute of the malaria parasite, the quality known as the "X factor" of Pettenkofer or the "epidemic potential."

In 1934 a periodical epidemic was due and, at the same time, several other things happened to occur simultaneously which were favourable to the spread of malaria: (a) a population which was non-immune after a series of exceptionally healthy years; (b) a drought which caused poverty among the population and brought about an abnormal proliferation of mosquitoes. The drought alone would not have caused the epidemic; droughts occur at irregular intervals in Ceylon and they are not always associated with epidemic malaria, but, in 1934, the drought and the X factor and the non-immune population happened to be present at the same time. The X factor did not cause an epidemic in the dry hyperendemic zone of the north because the population of that part of the island is relatively immune. Again, the X factor was unable to cause an epidemic in the southern zone, although there were many non-immune children there and although the drought had the same effect upon the rice crops and the rivers as it had in the epidemic area. This freedom of the southern zone, Colonel Gill ascribes to the absence of endemic malaria—the spleen rate is only 0.5 per cent.—and to the scarcity of *culicifacies*. He concludes that "by broadening the basis of the existing hypothesis in regard to the mechanism of malaria epidemics so as to ascribe a larger part in their causation to a periodicity pertaining to the malaria parasite, it is possible to provide a satisfying explanation of the remarkable characteristics of the Ceylon epidemic."

Colonel Gill studied and reported on the antimalaria work which has been carried out in Ceylon during the last 10 years or so. The measures included levelling, the stocking of ponds and wells with "millions," the treatment of water collections in the protected and controlled areas with oil or Paris green, and the provision of drains (mostly earth drains) for the removal of storm water. He found it most difficult to judge the amount of success achieved. The 5 years preceding the epidemic were exceptionally healthy, and it was therefore hard to say how much improvement was due to antimalaria measures. Another point is that in a place where the spleen rate has been reduced by antimalaria measures from, say, 60 per cent. to 30 per cent. the communal immunity has also been reduced and the proportion of children increased, and on this account an epidemic is likely to be more severe than if the spleen rate had remained at 60. "The organization of the Malaria Department, as well as the technique of anti-malaria operations, is in all respects admirable, and, if it cannot command success, it certainly has deserved it. . . . Taking all things into consideration it seems justifiable to infer that the control schemes have achieved a certain measure of success at Chilaw,

Puttalam, and Trincomalee, but it is doubtful whether they have had much effect elsewhere. The restricted measure of success does not however reflect upon the measures and methods employed or upon the manner in which they were executed; the main reason is undoubtedly the slow progress made with the drainage schemes on account of lack of funds."

The second part of the Report deals with recommendations for the control of malaria in Ceylon. Colonel Gill expects that the effects of the epidemic will gradually disappear and that there will be no serious outbreak until that due in about 1940. Epidemics once started are uncontrollable, but he believes that it will be possible to prevent their occurrence by the steady prosecution of antimalaria measures *during interepidemic periods*—"epidemic malaria is epiphenomenon of endemic malaria, from which it follows that measures that will reduce the incidence of endemic malaria will also prevent the outbreak of epidemics." [This is hard to reconcile with the statement in another part of the report that the reduction of the spleen rate from 60 to 30 per cent. would make an epidemic more dangerous by reducing the communal immunity.] The measures recommended are designed to eradicate the malaria-carrying mosquito, to reduce the number of human carriers, to alleviate economic stress and to improve hygienic conditions.

The main principle of Colonel Gill's scheme is that, where possible, malaria control should be entrusted to the local authorities, who would be given such financial and technical assistance as might be necessary. The scheme depends for success, he says, upon public opinion. He proposes the enactment of an Anti-Mosquito Ordinance which will make occupiers of property responsible for the execution of antimalarial measures, and empowers the Government, in default, to carry out the work at the cost of the occupier. He endorses the proposal to erect a Malaria Research Institute in commemoration of the Jubilee. Its function would be to carry out research and to give advice on all matters connected with malaria. Other important recommendations in his scheme are the creation of local public organizations under Medical Officers of Health, and the creation of a Sanitary Works Board to assist the local bodies, by grants in aid, to execute water supply and drainage schemes. The Director of Medical and Sanitary Services would exercise general supervision, and the staff of the Research Institute would give technical advice. It is strongly emphasized that malaria control should be part of the work of the public health branch of the Medical Department. In rural areas, "apart from simple measures that can be carried out by an intelligent sanitary inspector and the provision of ample facilities for the treatment of malaria . . . the only measures that can be suggested for controlling malaria . . . are general schemes for promoting rural betterment, more particularly land drainage schemes, irrigation schemes, and development schemes. . . . it is recommended that Government should assume responsibility for carrying out such measures as may be found, after investigation, to be practicable to control mosquito breeding in these rivers." As regards the control of malaria on estates, legislation is recommended making it obligatory upon the Superintendents to carry out all reasonable antimalaria measures. Colonel Gill draws attention to several matters of detail, some of which are of vital importance; it is necessary, for example, that the hospitals should be provided with microscopes and that the

medical officers should be instructed how to use them for the diagnosis of malaria. It is equally necessary that the stock mixtures of quinine should be standardized in order to ensure that proper treatment is given.

W. F.

CEYLON. Sessional Paper XXII.—1935. **The Ceylon Malaria Epidemic, 1934–35. Report by the Director of Medical and Sanitary Services** [BRIERCLIFFE (R.)].—96 pp. With 15 photographs. Supplement to Sessional Paper XXII.—1935. **Maps and Charts.** 20 maps & 8 charts. 1935. Sept. Colombo: Govt. Record Office. [Rs.4.50.]

Details are given of several cases in which death followed the administration of atebirin musonate.

This classical account of the Ceylon epidemic written by Dr. R. Briercliffe, Director of Medical and Sanitary Services, was largely compiled from information supplied by different officers of his Department; it deals with events up to the end of April, 1935. During April and May, a secondary wave of malaria swept over the epidemic area which will be dealt with by him in a future paper. A compilation from the same sources by Col. S. P. JAMES has been summarized above, and consequently this summary of Dr. Briercliffe's report is limited to matters such as the results of treatment with atebirin musonate.

A comparative test of atebirin musonate and quinine was made in the hospitals during April 1935. A group of 681 patients was given two intramuscular injections of 0.375 gram of atebirin musonate, with an interval of 24 hours between them. A second group of 424 patients was treated with two intramuscular injections of 15 grains of quinine, followed by quinine given by the mouth. Nearly a quarter of the patients in the atebirin group, as compared with more than a third of those in the quinine group, complained of pain at the site of inoculation; there were two abscesses in the atebirin group, but none in the quinine group. There were more deaths in the atebirin group, and 4 of the 17 which occurred in this series were attributed directly to atebirin. One of the patients was a young adult who collapsed and died 4 hours after her first injection. The other three were children; the first, aged 8 months, collapsed immediately after the injection and died 16 hours later; the second, aged 4 years, collapsed and died 4 minutes after the first injection; the third, aged 2 years, died a few minutes after the second injection.

Between May 20 and May 31, 1935, 1,387 persons in malarious villages were treated with atebirin injections; 61 suffered from toxic symptoms such as vomiting, collapse and abdominal pains. Mental symptoms, which in most cases lasted for about a week, occurred in 8 patients and one of them died from exhaustion. Pain at the site of inoculation was complained of by most of the patients, and in 9 abscesses resulted. The data available did not allow definite conclusions to be drawn with respect to the relapse-rate, "but the impression exists that a full course of atebirin by mouth (1.5 grams) has a greater effect in preventing the return of fever than a week's careful treatment with quinine, and that either of these courses of treatment is superior in this respect to two injections of atebirin musonate."

The following conclusions were reached from a study of the reports from hospitals and dispensaries in the epidemic area: "Probably in rather more than a half per cent. of the hospital patients treated with atebirin musonate death has been attributed to the drug. The greatest

care is necessary in the selection of patients for treatment . . . Small children have been specially liable to develop sudden collapse or convulsions. . . . The majority of patients suffering from malaria do not require to be treated with injections, whether of quinine or atabrin. When, however, treatment by injection is indicated, quinine is to be preferred to atabrin on account of its greater safety." Among adults, pregnant women have been found particularly liable to collapse after the injections. Sometimes symptoms of chronic or delayed atabrin poisoning which were attributed to faulty excretion of the drug appeared towards the end of a course of treatment. The temporary mental derangement which may result from the administration of atabrin proved a serious objection to its use ; in one district, where several hundred people had been treated with oral atabrin, at least 15 cases occurred and the use of atabrin was abandoned.

Colonel C. A. GILL writes in his report, which is summarized above that

" It is possible that the relative frequency with which toxic (cerebral) symptoms and abscesses at the site of injection are reported to have followed the administration of atabrin musonate during the epidemic is attributable to the low state of vitality of many of the patients. In these circumstances it is doubtful whether any experiment with atabrin musonate carried out in Ceylon during the epidemic is calculated to throw light upon its value under normal conditions."

The course of the epidemic can be followed in the Press Communiqués which were issued by the Ministry of Health, and of which copies are printed as an appendix to the Report. The hospital deaths and admissions for malaria were : October, 1,584 cases, 32 deaths ; November, 4,178 cases, 65 deaths ; December, 14,480 cases, 381 deaths. The amount of malaria in the epidemic area began to decrease during the last week in December ; throughout January and February the decline continued, and in March it became even more rapid, but in April the situation became less favourable owing to localized outbreaks.

Extensive anti-larval measures were started in January. The oiling of breeding places in the beds of the main rivers and their larger tributaries was undertaken where *A. culicifacies* larvae were found to be prevalent, and 300 miles were brought under control. The Report contains some good photographs of the rock pools in the bed of the Maha-oya, Ceylon's largest river, which were breeding places of *A. culicifacies*. The following is taken from a communiqué issued by the Ministry of Health :—

" The Department wishes to make it clear that the mosquito which is carrying malaria in Ceylon, viz., *Anopheles culicifacies* is not breeding in roof gutters, coconut shells, cans, etc., but in open pools of clear water, in river beds and in rock quarries. It may also be found in shallow wells, brick pits, borrow pits, saw pits, etc., where the water is clear and exposed to sunlight. It does not breed to any great extent in paddy fields or swamps." W. F.

DICKSON (R. M.). *The Malaria Epidemic in Ceylon, 1934-35.*—*Jl. Roy. Army Med. Corps.* 1935. Aug. Vol. 65. No. 2. pp. 85-90.

The author directs attention to the poverty and distress caused by the drought and to the measures taken to alleviate these and combat the epidemic of malaria.

Col. JAMES's report of this epidemic has already been summarized. The present paper deals more fully with the measures taken. The medical authorities always keep a reserve supply of quinine equal to 10 months' normal requirements; more than 7,000 lb. were available at the beginning of the epidemic and additional supplies were quickly obtained. The State Council approved the formation of a Malaria Relief Fund. The Government contributed 300,000 rupees and the public about 45,000. Local Relief Committees were appointed and these were responsible for the distribution of rice and foodstuffs. At the dispensaries in the worst areas, Horlick's malted milk was distributed to the children, and food kitchens were established by voluntary agencies. "Distress and destitution are likely to increase for some time to come, but relief measures are now well organized and are sufficient to meet the situation." [See also S. P. JAMES, BRIERCLIFFE and GILL, above.] W. F.

FEDERATED MALAY STATES. **Annual Report of the Malaria Advisory Board for the Year 1934** [KINGSBURY (A. Neave), Chairman].—27 pp. 1935. Kuala Lumpur: F.M.S. Govt. Press.

This contains an important report on drain flushing as a method of larval control. It also contains a good summary of antimalarial work done in connexion with fish-ponds in Java, and notes on *A. umbrosus* and *A. barbirostris* as carriers in the Federated Malay States.

A committee appointed by the Board to inquire into the utility of sluicing as an antilarval method in Malaya reported that:—

"Sluicing has not so far been found dependable in preventing the breeding of larvae in those seepages and small water channels which form the principal breeding places of *A. maculatus*. In small streams running in firm soil, in those streams in flat land which require treatment, but pre-eminently in streams running over rock, sluicing is likely to prove of value in antimalarial work. Sluicing is unsuited to use in streams in the more friable soil characteristic of a great part of the country. In these streams the rapid erosion caused by sluicing results in undercutting of the banks, the formation of numerous side pools and silting up of the reservoirs. . . . It is considered that sluicing is unlikely to prove of sufficient general application to warrant further *expensive* experiments by this Board."

In the Cameron Highlands, where Professor Williamson first reported the successful employment of sluice-gates, further investigation showed that "the use of temporary gates here on a large scale has not been sufficiently successful, either economically or in preventing larval breeding, to justify the method replacing oiling control." Sluicing was tested over a period of 11 months in the town of Lipis, in Pahang, and the Health Officer reported: "Chinese squatters living in the ravine while sluicing was employed developed malaria for the first time; when oiling was resumed no more cases of malaria occurred." On the other hand, considerable success has been claimed for the method in Province Wellesley and in the Island of Penang. (See this *Bulletin*, 1934, Vol. 31, p. 153 and 1935, Vol. 32, p. 429).

Dr. B. BARROWMAN drew attention to an increase of malaria in the flat coastal districts of the west coast where *A. umbrosus* is the carrier. Clean drains and clean weeding had controlled the breeding of this mosquito, but owing to hard times weeding had been neglected and drains had become blocked. The shade necessary for the breeding of this mosquito could be provided by vegetation only a few inches

high. It was not enough merely to fell heavy jungle; the entire surface had to be clean weeded.

Dr. R. S. JOHNSTON reported on endemic malaria in the township of Batu Gajah, where it has been found that *A. barbirostris* is the vector.

Dr. J. C. P. GREY who had paid a visit to Java in order to study the methods of malaria control adopted there, gave an account of the different methods by which the fish-ponds are treated in order to prevent mosquito breeding. He stated that "It had been in many ways curious, after experience in Malaya, to see the light-hearted treatment accorded to *A. maculatus*. In no place was its control by anti-malarial oiling or by subsoiling observed." W. F.

SWELLENGREBEL (N. H.). **The Basis of Malaria Control by Antilarval Measures in the Netherlands.**—*Malayan Med. Jl.* 1935. Sept. Vol. 10. No. 3. pp. 61-66.

Professor Swellengrebel has the gift of lucid exposition. This is a delightfully clear account of the spring epidemic of malaria in northern Europe and of the different types of *maculipennis*. It should be invaluable to lecturers and students, and has been summarized rather fully for this reason though it covers ground which has been covered already by papers previously summarized in this *Bulletin*.

The only species of *Anopheles* in Holland is *A. maculipennis*. It is present throughout the whole country, but malaria is limited to the coastal provinces. It does not occur in all of them; the province of South Holland is just as watery and low-lying as the others, yet it is free from malaria while the adjoining province, North Holland, is the most malarious area in the country. The problem which faced the author on his return from the East in 1919 was to discover the reason for this, and here he tells how it was done.

Benign tertian malaria occurs every year in North Holland and, in epidemic years, as many as one-fifth of the total population may be attacked. The epidemics occur about every twenty years and they last for 3 or 4 years. The highest incidence of malaria is in May, June and July. During the period January to August of the epidemic year 1920, the author dissected a large number of mosquitoes caught in houses where malaria was rife, but he found hardly any infected specimens and would have given up the search in disgust had he not been dissuaded by his friend Dr. Korteweg. Korteweg had been practising for many years in a malarious village north of Amsterdam; every spring he had seen a number of primary cases of malaria at a time when there were no mosquitoes about, and he came to the conclusion that these spring cases were the result of infections which had been acquired in the previous autumn and had remained latent throughout the winter. The number of cases of malaria in Holland varies inversely with the number of mosquitoes present at the time; in the spring, when there are no mosquitoes, the greatest number of malaria cases occurs. During the period September to February, when there are no malaria cases, the greatest number of anopheles are found in houses. Swellengrebel was persuaded by Korteweg to continue his dissections in the autumn and winter, when the malaria season was over. He writes:—

"Although I had little faith in dissecting anopheles at the tail-end of the malaria season, I did as Korteweg told me. Well, it gave me the thrill

of my life. Here they actually were—the infected anopheles, which I had been vainly looking for in summer. Three per cent. of all the mosquitoes collected in September were infected; 5–6 per cent. in the other months of the year 1920, and a lower percentage in January till March. Then the infection stopped. . . . Why did I not find infected anopheles in summer? For two reasons: first, because these anopheles do not usually feed on man in summer, but they do in autumn. Catching anopheles in houses in summer and selecting the engorged females, yields one only with human blood out of every ten tested. But from September onwards eight or nine out of every ten tested have bitten man. That is one reason. The other is that infected anopheles in summer are creatures of a short life. There is a heavy mortality among them. But as soon as egg-laying stops, and that happens by the beginning of September, the mortality sinks from over 60 dying within 4 weeks out of a batch of a hundred, to no more than 20 dying within 4 weeks out of a batch of a hundred.”

Though infected anopheles are most numerous in the autumn the malaria season does not occur until the following spring. Korteweg's hypothesis that the infections, transmitted to man in the autumn, remain latent until the spring, was confirmed by James in England and by the author and his colleagues in Holland, where 8 volunteers who were bitten experimentally by mosquitoes in the autumn first showed signs of malaria in the following spring and summer.

The author found that during the season of transmission, that is during the autumn and winter, the warm houses and stables contained many anopheles which were wintering there. These “winterers,” as he calls them, continued to suck blood although they had ceased to lay eggs and therefore had no need to leave their shelters. In some districts, the anopheles sought cold lofts and sheds in which to pass the winter, rather than the warm houses and stables. These anopheles were in a state of hibernation; unlike those in the warm shelters, they did not continue to feed after they had ceased to lay eggs. A map was prepared showing the distribution of the *winterers* and the *hibernators* throughout the Netherlands in autumn and winter. It then came out that the winterers preponderated in the malarious coastal districts and the hibernators in the healthy inland districts. As regards the one healthy coastal province, South Holland, there too the anopheles were hibernators, while in the malarious provinces of North Holland, to the north, and Zeeland to the south, they were winterers. In all these provinces the anopheles breed in the ditches, but South Holland is the delta of the Rhine and Meuse and its ditches contain fresh water. The malarious province of North Holland has the North Sea to the west, and the Zuyder Zee to the east; no rivers carrying fresh water run through it and consequently the water in the ditches is brackish. The malarious provinces are characterized by the presence of winterers and of breeding places containing brackish water; but in the healthy provinces, the anopheles are hibernators and the breeding places contain fresh water.

Is there a fundamental difference between the winterers and the hibernators? The two types were collected separately in their winter quarters and kept in the laboratory until they laid their eggs and until these produced larvae. It was then found that there were morphological differences between the eggs and larvae of the winterers on the one hand and of the hibernators on the other. The winterers will breed in captivity, and it was soon established that the egg and larval characters remain constant from generation to generation.

The hibernators will not breed in captivity, but male hibernators will mate with female winterers, and male winterers with female hibernators; it has been found, however, that the eggs which result from these cross-matings rarely hatch, and, if they do, the larvae all die within 24 hours. The winterers and the hibernators are therefore *sexually isolated*; they are, indeed, constant species. More recently it has been found possible to distinguish the adult winterers from the hibernators, during the autumn and winter, by the shape of their salivary glands. Consequently they can now be separated in cases where they are both occupying the same winter quarters, as they do in attic bedrooms. Here they are not segregated as they are in warm rooms and stables on the one hand, and in cold lofts and sheds on the other; in the attics, both types find what they need; blood for the winterers and a low temperature for the hibernators. The hibernators never touch blood and are never infected, though they may be perched on the same wall as the winterers which, in some houses during the autumn of 1934, were found infected up to a maximum of 25 per cent. [see DE BUCK and SWELLENGREBEL, below.]

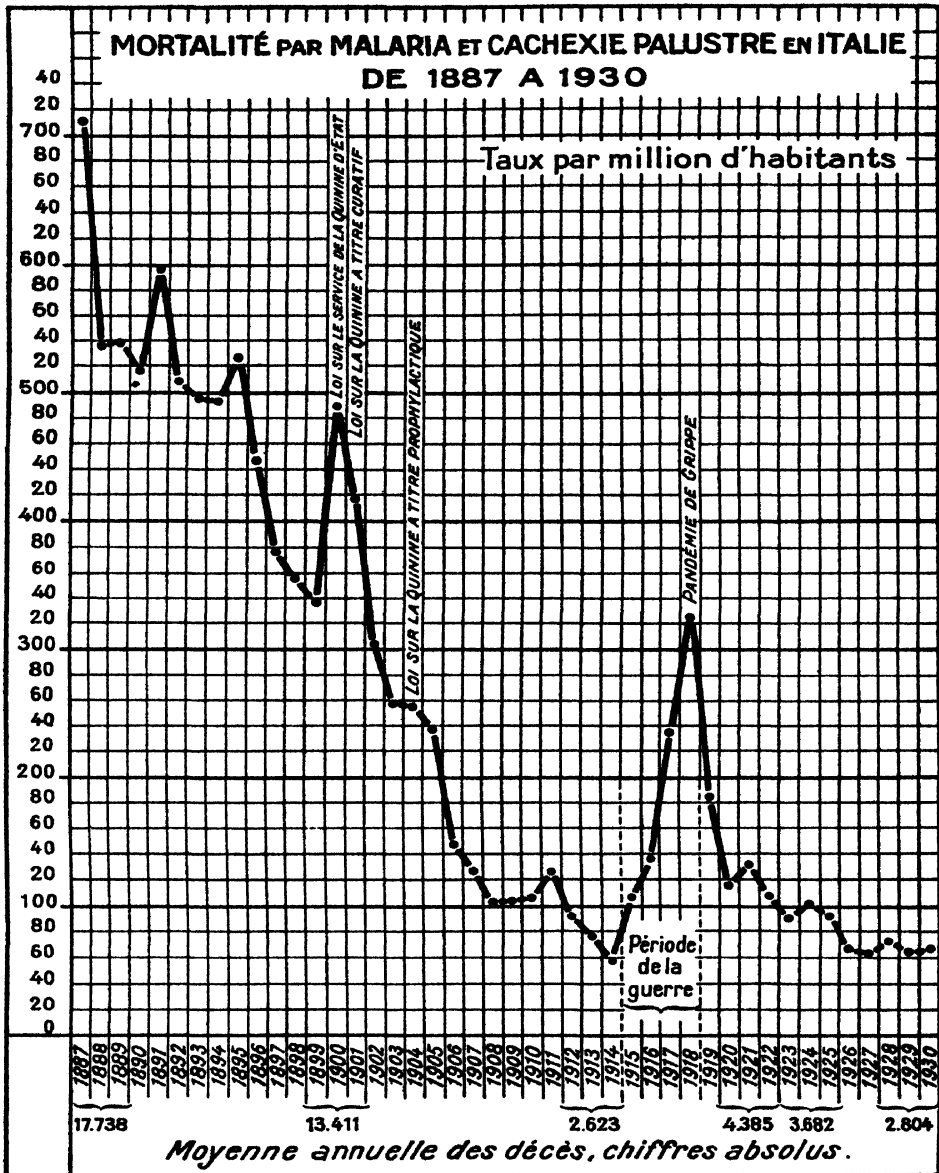
The author and his colleagues next discovered that the different types preferred different places for breeding purposes. They examined over 1,400 breeding-places and over 23,000 larvae, and they came to the conclusion that the hibernators preferred fresh water with less than 500 milligrams of chlorine per litre, while the winterers (*A. maculipennis atroparvus*) preferred brackish water with a salt content of more than 1,500 milligrams of chlorine per litre. The malarious province of North Holland has sea on both sides and brackish water in its ditches; but the sea on the east side has now been cut off from the open sea by a dam, and, as the river Yssel flows into it, it is gradually becoming less brackish. This is a part of the Zuyder Zee reclamation scheme now in progress. It is hoped that this fresh water lake can be used to reduce the salinity of the surface water in North Holland to a harmless level; when this has occurred it is expected that the hibernators will invade the province at the expense of the malaria-carrying winterers, and that malaria will gradually disappear.

W. F.

LUTRARIO (A.). La malaria en Italie. [**Malaria in Italy.**—*Bull. Office Internat. d'Hyg. Publique*. 1935. June. Vol. 27. No. 6. pp. 1141–1160. With 2 charts.

Many papers have been written about malaria in Italy, and many of them have been summarized in this *Bulletin*. The present paper deals with the subject in an interesting and comprehensive manner, and the author demonstrates clearly the remarkable decline of malaria in Italy during the last 50 years, particularly since the application of the malaria laws and the systematic distribution of quinine.

He draws particular attention to the rhythmical rise and fall which occurs in malaria. Small cycles which coincide with the yearly seasons, larger ones with periods of 4 or 5 years, and others yet larger whose duration is to be measured in centuries. These large cycles are demonstrable in the history of Rome. In its early days it was free from malaria, but in the third century B.C. the disease appeared in epidemic form. At the beginning of the present era, Rome was once more healthy, but in the sixth and seventh centuries malaria was again severe. In the eighth century there was a remission, and



Mean annual death rates per million from malaria in Italy from 1887 to 1930.

[Reproduced from the *Bulletin de l'Office International d'Hygiène Publique*.]

prosperity returned to the country; in the ninth, the country was once more devastated by malaria. The next period of relative freedom appears to have been at the time of the Renaissance, but from 1600 to 1750 malaria was again severe. Then once more there was an amelioration until the nineteenth century when malaria increased again. From the year 1879 onwards, there was a tendency to spontaneous regression which is apparent in the accompanying graph.

The graph also shows in its earlier part the cyclical exacerbations which occur every 4 or 5 years, and demonstrates how these have been suppressed since the quinine laws were instituted at the beginning of the present century. Subsequent to the manufacture and free distribution of quinine by the State, the death-rate per million from malaria sank from 417 in 1900 to 57 in 1914. W. F.

COLONIAL DEVELOPMENT FUND (MALARIA RESEARCH SCHEME).

Report on Work done at Dar es Salaam during the Period January 1932-January 1934 [MACKAY (Roderick), Malaria Research Officer].—79 pp. With 13 charts & 4 folding plans. [11 refs.] 1935. London: Crown Agents for the Colonies, 4 Millbank, S.W. 1. [10 Shs.]

Of special general interest are an outbreak of poisoning following the use of Paris green, a number of cases of congenital malaria, and the finding of *A. costalis* in brackish water.

Dr. Mackay's report on this very thorough survey of Dar-es-Salaam begins with a review of the investigations of KOCH and OLLWIG. In 1899 KOCH instituted an anti-malaria campaign by means of quinine. This work was continued for 12 years. Its effect was to reduce the total amount of malaria, but it was useless as a method of eradicating malaria. The town was only a fishing village in 1890, when the German administration was established. It lies in a valley half of which is below sea level; a tidal flap in an embankment constructed during the German administration prevents the ingress of the sea. The population totals 33,000 consisting of many different African tribes, two-thirds are Bantus. The examination of a random sample of 8,310 persons showed that 54·2 per cent. were infected. The parasitic index, in children, was 77·2 per cent. The commonest infection was subtertian; of 6,071 positive examinations, there were 4,069 or 66·9 per cent. subtertian, 969 or 15·9 benign tertian, 587 or 9·9 quartan, while 446 or 7·3 per cent. were not differentiated; these last included a small proportion of *P. ovale* and *P. tenue*. It seems likely that "the human host finds it easier to establish an equilibrium between himself and *P. vivax* or *P. malariae* species than is the case with *P. falciparum*, which alone persistently increases with advancing age . . . a considerable proportion of children are born with definite evidence of malarial infection contracted *in utero*; . . . 44 blood smears, taken from the peripheral blood of infants at birth, have yielded eight subtertian trophozoites and one benign tertian gametocyte"; *Anopheles gambiae* (*costalis*) is by far the most important mosquito; *A. gambiae* and *A. funestus* were the only anopheles caught in houses. Out of 146 *A. gambiae* dissected, 6·8 per cent. were infected with sporozites; out of 179 *A. funestus*, 3·3 per cent. were infected. *A. gambiae* was found breeding not only in fresh water but also in water with a high saline content. It usually breeds in shadeless water while *A. funestus* prefers a degree of shade. An examination of anopheline stomach contents showed that 81 per cent. contained human blood. Other figures indicating the amount of malaria in the town are a spleen rate of 83·8 and an incidence of 5·9 cases of black-water fever per 1,000 cases of malaria. The development of the parasite in the mosquito occupies 10 days in the wet season, but 21 in the dry season. A number of cases were given atabrin 0·2 gram and plasmoquine 0·02 gram daily for 8 days. Epigastric pain was

invariably complained of by adults towards the end of the 8-day course, but it did not occur if the plasmoquine was discontinued on the 5th day. "Benign tertian sometimes fails to react to these drugs." The report contains a note on an outbreak of poisoning which resulted from the use of Paris green as a larvicide. "The routine treatment of 8 water-holes and a weed-covered pool once weekly, maintained over a period of three months, resulted in the illness of 132 persons, representing a large proportion of the native community using the treated water for domestic purposes . . . the strength of the final dust was 1 : 100." W. F.

COVELL (G.), BAILY (J. D.) & VIDYA PRASAD. **An Experiment with Paris Green in a Hyperendemic Village in Sind.**—*Records of the Malaria Survey of India*. 1935. June. Vol. 5. No. 2. pp. 131–152. [11 refs.]

Paris green is not a suitable larvicide for dealing with running water. The control of malaria in hyperendemic rural areas in India is not likely to be achieved by antilarval measures. Lack of funds is the greatest obstacle to the control of malaria in rural areas. The antilarval work described here cost about 2½ pence per head per annum, and that is apparently more than would be available for general use. In the Panama Canal zone, GORGAS spent 2 dollars gold per head, per annum, on malaria prevention. The experiment described by the author was carried out in a hyperendemic village in Sind. Anopheline breeding places were dusted with Paris green for a limited period of each year over a period of 4 years. Conditions were considerably altered during the last two years by the institution of new irrigation under the Lloyd Barrage scheme. There was a partial success during the first two years, but this was not maintained. W. F.

COVELL (G.). **The Effect of Paris Green Dusting on Rice Crops.**—*Records of the Malaria Survey of India*. 1935. June. Vol. 5. No. 2. pp. 153–157.

The general opinion among malaria workers is that Paris green has no harmful effect upon rice crops. The farmers in many places say that it is beneficial because it destroys the insect pests. The Deputy Director of Agriculture, Orissa Range, Cuttack, states that Paris green is harmful if applied early in the morning when the flowers are open, but if the dusting is done in the afternoon, when the flowers are closed, no harm results. These opinions were obtained by the author from published papers, and as the result of a questionnaire sent to malariologists in India and other countries. W. F.

SYDENSTRICKER (V. P.) & VRYONIS (G. P.). **Vital Staining of Malarial Parasites. A Preliminary Note.**—*Jl. Lab. & Clin. Med.* 1935. July. Vol. 20. No. 10. pp. 1094–1096. With 1 fig.

The authors have found that for the study of malarial parasites vital staining offers certain advantages over the methods usually adopted. Various stains have been investigated but the best results were given by a saturated solution of brilliant cresyl blue in sterile physiological saline. A small drop of this (2 cmm.) is placed on a slide and a cover glass on which a drop of blood has been placed is dropped on to the stain. The preparation is ringed and is ready for

examination at once, as staining of the parasite is almost instantaneous. The parasites remain alive for upwards of 2 hours on the warm stage. The paper describes the attachment of merozoites to the red cell, their movement over the surface of the cell before penetration, which is followed by the development of an extraparasitic vacuole, and the character of other stages both for *P. vivax* and *P. falciparum*. Changes in the parasites are brought about by the administration of quinine. It seems that the method will be useful for the study of the relation of the parasite to the reticulocyte and of the action of drugs. A black and white half-tone plate illustrates some of the appearances noted.

C. M. Wenyon.

PAWAN (J. L.). **The Preservation in the Tropics of Blood Smears stained by the Romanowsky Stain.**—*Ann. Trop. Med. & Parasit.* 1935. Oct. 5. Vol. 29. No. 3. pp. 327–328.

Seven years ago the author published a note to the effect that Romanowsky stain and its modifications could be kept without deterioration in the tropics if maintained in solution in a Pyrex bottle [this *Bulletin*, 1929, Vol. 26, p. 563]. The preservation of the stained blood smears for future reference or study is another question altogether; they usually deteriorate markedly within a year under tropical conditions. Dr. Pawan finds, however, that if the stained slide be dipped in saturated solution of paraffin wax in xylol (kept saturated at 37.5°C. in the thermostat so that a cloud of solidifying paraffin begins to appear after removal to room temperature), by evaporation of the xylol the slide is coated with a thin layer of paraffin. It can then be put away, and when the slide is needed for examination the paraffin is removed by immersion in xylol. When finished with, the immersion oil is removed with xylol and the whole slide redipped. Thus treated, slides have kept the original staining unaffected for over 5 years in Trinidad, even though exposed to sunlight in the laboratory.

H. H. S.

BOYD (Mark F.). **The Comparative Morphology of the Sporozoites of the Human Species of *Plasmodium*, *Marchiafava* and *Celli*, 1885.**—*Jl. Parasitology*. 1935. Aug. Vol. 21. No. 4. pp. 255–259. With 8 plates.

Comparing the sporozoites of the three common malarial parasites of man the author finds that individual variations are so great that species identification is quite unreliable. Nevertheless he finds that generally those of *Plasmodium falciparum* are the finest and those of *P. malariae* the coarsest. Similarly the chromatin mass is densest in the former and most diffuse in the latter. Three pages of outline drawings illustrate the various types of sporozoite observed.

C. M. W.

DE BUCK (A.). Ein morphologischer Unterschied zwischen zwei *Plasmodium vivax*-Stämmen. [**Difference between Two Strains of *Plasmodium vivax*.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Aug. Vol. 39. No. 8. pp. 342–345. With 1 fig.

Investigating different strains of *Plasmodium vivax* used in the treatment of general paralytics the author finds that the strains differ

from one another as regards the average incubation period, number of parasites present and number of merozoites produced per schizont. These and other differences seem to be present, regardless of the method of infection, whether by inoculation of blood or by the bite of a mosquito, so that they can be regarded as due to inherent characteristics of the strains in question. C. M. W.

JAMES (S. P.). Le paludisme par *Plasmodium ovale*. [*Plasmodium ovale*.]—*Riv. di Malarologia*. Sez. II. 1935. Vol. 14. Supp. to No. 3. pp. 27–31.

It is useless to look for *P. ovale* in thick films. It is best to employ two thin ones; one deeply stained to show the changes in the corpuscles, and the other lightly stained to show the character of the pigment and the morphology of the parasite. It is most important to have at hand typical stained specimens of the different species of malaria parasites for comparison; the comparison should be made with the help of a micrometer-eyepiece. It is almost impossible to identify *P. ovale* in the early ring form; in the half-developed stage and later, it looks like a quartan parasite in an hypertrophied corpuscle spotted with Schüffner's dots. Comparison with a type specimen of quartan shows that there are differences in the pigment. An important point is the scalloped or fringed edge of the corpuscle. In the early stages of division, the parasite is rounded and lies in the middle of a large oval corpuscle which is sometimes fringed. The stage of complete division is represented by 8 merozoites, surrounding a central block of pigment, lying in a corpuscle full of Schüffner's dots. (See this *Bulletin*, 1935, Vol. 32, p. 737.) W. F.

CHANG (Y. H.), LI (C. C.) & YOUNG (M. P.). **A Clinical and Laboratory Study of 196 Cases of Malaria.**—*Chinese Med. Jl.* 1935. May. Vol. 49. No. 5. pp. 477–478.

This study is based upon 196 cases of malaria in the Elizabeth Blake Hospital, Soochow. Subtertian, 63 per cent., was the most common. Liver damage was shown by the inability to store glycogen, as indicated by the high blood-sugar index 2 hours after a test meal. Albuminuria occurred in 20 per cent. of the subtertian cases and in 6 per cent. of the tertian cases. The case mortality was 1.6 per cent.

W. F.

UTTLEY (K. H.). **A Spleen Rate Survey in the Colony of Hongkong.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. July 31. Vol. 29. No. 2. pp. 187–190.

BOURGIN (P.) & NGUYEN-VAN-TAN. Premier essai sur le paludisme à Soc-trang.—*Bull. Soc. Méd.-Chirurg. Indochine*. 1935. Feb.–Mar. Vol. 13. No. 2. pp. 97–112. With 5 charts (1 folding).

DALEAS (P.). Paludisme et grossesse. De leur influence réciproque. [**Malaria and Pregnancy.**]—*Bull. Soc. Méd.-Chirurg. Indochine*. 1935. May. Vol. 13. No. 4. pp. 432–435.

Parturition and abortion during the course of severe, acute or chronic, insufficiently treated malaria may be followed by collapse. Contrary to common belief, parturition rarely brings on an attack in

cases of latent malaria. The author has found that Henry's reaction is often positive in the newly-born children of Indo-China, and he concludes that congenital malaria is common though parasites are rarely found in the peripheral blood of the babies. *W. F.*

WICKRAMASURIYA (G. A. W.). **Some Observations on Malaria occurring in Association with Pregnancy. With Special Reference to the Transplacental Passage of Parasites from the Maternal to the Foetal Circulation.**—*Jl. Obstet. & Gynaecol. Brit. Empire.* 1935. Oct. Vol. 42. No. 5. pp. 816-834. [14 refs.]

Six cases of congenital malaria are reported: (1) Massive infection of placenta with subtertian parasites. A few parasites in blood from umbilical cord. Baby had rise of temperature on fifth day, but the blood was not re-examined. (2) Massive subtertian infection of placenta; intra-uterine death of foetus; parasites found in foetal brain and spleen. (3) Placental infection, intra-uterine death of foetus; parasites in foetal brain and spleen. (4) Mother died from subtertian malaria; malarial pigment, but no parasites, found in foetus. (5) Mother died from cerebral malaria; subtertian parasites found in heart's blood, spleen and liver of child. (6) Mother died of malaria; crescents found in blood from cord, but none in foetal liver or spleen. *W. F.*

VAN NITSEN (René). Le paludisme chez l'enfant indigène.—*Ann. Soc. Belge de Méd. Trop.* 1935. June 30. Vol. 15. No. 2. pp. 229-268. [13 refs.]

MILNE (J. Coutts). Malaria: Fresh Infections *versus* Relapses.—*Malayan Med. Jl.* 1935. June. Vol. 10. No. 2. pp. 49-50.

ZAUN (F.). Das Verhalten der Leber bei Malaria. (Eine zusammenfassende Uebersicht mit Untersuchungen.) [**The Liver Functions in Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Sept. Vol. 39. No. 9. pp. 363-373. With 3 figs. [67 refs.]

A study of certain functional liver tests in cases of malaria. Attention was directed to the following:—1. Bloodsugar level. 2. The non-protein nitrogen of the blood. 3. The serumbilirubin; and 4. The excretion of urobilin, including urobilinogen. The author summarizes the work which has been done on these subjects including his own. He considers that in malaria a rise in level of the blood sugar suggests an indirect, general damage of an infectious-toxic nature to the liver, the finding of serumbilirubin and urobilin indicates a slow mechanical and chemical damage, a rise of the non-protein nitrogen appears to be related to an increased protein destruction in the body. He considers, however, that further investigations are required to clarify the position. He states that he finds, contrary to some other investigators, that the new drugs, atebirin and plasmoquine, cause no damage to liver function. *E. D. W. Greig.*

TRENSZ (F.). Sur les propriétés antigènes de l'hémozoïne. [**Henry's Reaction. The Antigenic Properties of Haemozoin.**]—*Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 558-560.

It has no antigenic power.

Henry ascribes his reaction to the presence of antibodies in the blood of malaria patients, which have resulted from the presence of

malaria pigment (haemozoin) which has acted as an antigen in the body. Henry employs melanin as the antigen in his reaction instead of haemozoin, although they are chemically distinct from one another. If Henry's reaction is, as he claims, a specific reaction between antigen and antibody, haemozoin should act even better than melanin. The author obtained haemozoin from the liver and spleen of a fatal case of malaria. It did not give such good results as melanin when it was used in Henry's reaction. Numbers of rabbits were inoculated with haemozoin in order to determine if antibodies were produced. The serum of these rabbits did not flocculate with the antigen, nor did the intradermal reaction following the inoculation of haemozoin differ in any way from that in normal rabbits. The author concludes that haemozoin does not act as an antigen. W. F.

PRUDHOMME (R. C.). Différents indicateurs remplaçant la mélanine dans la réaction de Henry. [**Henry's Reactions. Substitutes for Melanin as Indicators.**].—*C. R. Soc. Biol.* 1935. Vol. 119. No. 25. pp. 1115-1117.

The serum of malaria patients has no specific affinity for melanin which merely serves as an indicator of the instability of the serum in distilled water. Many other substances can be used with advantage in place of melanin, and the author recommends a fine suspension of carmine in distilled water. W. F.

TRENSZ (E.). De l'emploi d'une mélanine choroidienne purifiée dans la séroflocculation palustre.—*Ann. Inst. Pasteur.* 1935. Aug. Vol. 55. No. 2. pp. 208-226. With 1 chart. [15 refs.]

CHORINE (V.). Flocculation et surflocculation dans la réaction de Henry.—*C. R. Soc. Biol.* 1935. Vol. 119. No. 27. pp. 1323-1326.

BRITISH MEDICAL JOURNAL. 1935. Sept. 21. p. 552. **Malaria and its Treatment.**

Colonel JAMES, in opening a discussion at a meeting of the Chemistry Section of the British Association on September 9th, stated that although we disbursed annually nearly £500,000 on the purchase of quinine, yet our expenditure for malarial research amounted to barely a two-hundredth part of this sum. In Ceylon recently, £20,000 was spent on the German drug, atabrin. In this country, he said, there was a backwardness in research into the chemistry of antimalarial drugs. Professor R. ROBINSON stated that the research in England had now reached a stage where further progress was impossible without better facilities. Chemical and biological co-operation was necessary, and a national institute for research in chemical therapy was needed, where chemists and biologists could work together. Professor SCHULEMANN said that he attributed the German successes with atabrin and plasmoquine to co-operation with biologists, and to the new animal tests devised by them. [It is generally accepted that atabrin and plasmoquine are much more likely to cause abdominal pain when they are given together, than when they are given one after the other, and in this discussion, an authoritative statement was made by Professor Schulemann to the effect that this is actually the case.]

W. F.

SOESILO (R.) & GILBERT (A. Ph. W.). Waarnemingen over chemische prophylaxis in een ernstig chronischendemisch malariagebied. [**Prophylactic Drug Treatment in a Hyperendemic Malarial Region.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1935. July 8. Vol. 75. No. 14. pp. 1141–1145.

This trial of various remedies was made in the field on an alternate case basis. The total number of children involved was 175 of whom 40 were under and 135 over 3 years; their spleen index amounted to 100 per cent., while the parasite index was 65·7 per cent. All the children received malaria tablets D.V.G. (each containing 240 mgm. quinine sulphate and 2 mgm. plasmoquin) for one week in therapeutic doses, after which the prophylactic trial began of the different test medicaments for a period of 15 weeks: then came stoppage of the medication with continuance of examination of the parasite index, for 28 weeks in all. The groups, I, II, III, IV, with 43, 44, 43, and 45 children in each, received during their course of prophylactic (subtherapeutic) dosage on 3 days in the week $\frac{1}{2}$ –1 tablet (50 mgm.) atebtrin, $\frac{1}{2}$ –2 tablets (100 mgm.) quinine hydrochlorate, $\frac{1}{2}$ –2 malaria tablets D.V.G. and anti-beriberi-vitamin tablets respectively. The last group was the control group of no antimalaria treatment. Table A gives the results of the first week of therapeutic treatment and the following 15 weeks of prophylactic treatment. It shows that:— (1) The administration of daily therapeutic doses of D.V.G. malaria tablets for 1 week had lowered the total parasitic index of 65·7 per cent. to 4·5 per cent. (2) The children of atebtrin group I remained wholly parasite free. (3) Groups II (quinine) and III (D.V.G.) were never completely free of parasites, but had a much lower parasite index over the whole 15 weeks than before treatment was begun. (4) Control group IV (no treatment) had a consistently higher index than groups II and III, but this was, nevertheless, lower than before the trial began. This lowering is ascribed to lessened chance of infection from the children of the other groups. (5) The great difference between the parasite index of the groups before therapy and during prophylaxis (not higher than 22·8 per cent.) is ascribable to the action of the different preparations, especially as the index in a neighbouring village at the end of the 12th week was 65·2 per cent. (6) D.V.G. malaria tablets in the doses given had less effect than quinine hydrochloride. Table B shows that the stoppage of the prophylaxis resulted in a rise of the parasite index in all the test groups and that the continued action of atebtrin for at least 2 weeks is not clearly proven. [D.V.G. apparently stands for *Dienst der Volksgezondheid*, and signifies the official malaria tablet.]

W. F. Harvey.

BONNE (W. M.) & STOKER (W. J.). Prophylaxe bij malaria (atebrine, chinoplasmine en chinine). [**Malaria Prophylaxis with Atebrin, Quinoplasmine and Quinine.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1935. June 11. Vol. 75. No. 12. pp. 958–969. With 1 chart. English summary.

All these drugs acted well as long as they were continued. When they were stopped, there was more malaria than in the untreated control group. Possible danger of acridine sensitization.

The experiments were made in the prison at Bangoredjo, Java. The prisoners were divided into four groups of 75 persons. The first group received one tablet of atebtrin (0.1 gram) every evening; the second group, one tablet of quinoplasmine (0.01 gram plasmoquine and 0.3 gram, or $4\frac{1}{2}$ grains, of quinine); the third group, two tablets of quinine (0.4 gram or 6 grains); the fourth group was the control. The drugs were given for three months, and this was followed by an observation period of two months. The results were as follows:—*Atebtrin group*: no clinical case of malaria occurred during the three months. Parasites were found only twice at the weekly thick-film blood examination. Three weeks after the treatment had been stopped, the parasite index was no better than in the control group. There were no toxic symptoms, but, at the end of the treatment, every patient was stained yellow. This is objectionable from the standpoint of the patient, it also raises the question of the cumulation of atebtrin, and the danger of hypersensitivity to the sun following the deposition of acridine in the skin. The van den Bergh reaction was negative, but positive reactions for urobilin in the urine were more numerous than in other groups. The *quinoplasmine group*: there were two clinical cases, with 44 hospital days. The *quinine group*: there were 4 malaria cases, with 50 hospital days. The *control group*: 21 cases, with 243 hospital days. After the prophylaxis was finished the parasite index, especially in the quinine group, rose abnormally; probably as the result of many latent infections. W. F.

DRUMMOND (R.). **Prophylactic Quinine in Malaria in Nyasaland.**—*South African Med. Jl.* 1935. June 22. Vol. 9. No. 12. p. 417.

MARAÑON (Joaquin), PEREZ (Amando) & RUSSELL (Paul F.). **Philippine Totaquina.**—*Philippine Jl. Sci.* 1935. Mar. Vol. 56. No. 3. pp. 229–255. With 2 folding figs. [22 refs.]

Cinchona with an excellent alkaloidal content can be cultivated in the Philippines, and a satisfactory totaquina can be prepared locally and sold at a seventh of the present price of quinine.

The authors have made clinical tests with totaquina extracted at the Bureau of Science from the bark of cinchona trees grown by the Bureau of Forestry in Bukidnow, Miridanao. The plantation was begun in 1927 with seeds obtained from Java, and there are now 38,000 trees consisting of *C. Ledgeriana*, *C. succirubra* and *C. hybrida*, on an area of some 35 acres, situated at an altitude of 2,500 feet, with an annual rainfall of 112 inches and a temperature ranging from 62° to 84°F. Some bark from 5-year-old trees has been analysed with very satisfactory results. The percentage of alkaloids in the *C. Ledgeriana* bark was 9.6 per cent. as compared with 8.52 for India and 8.6 for Java. The yield for *C. hybrida* and *C. succirubra* was about 4.6 per cent. as compared with 6.25 and 7.7 per cent. for *C. succirubra* in India and Java, respectively.

The authors estimate that at least two million cases of malaria occur yearly in the Philippines, and that 32,400 kilograms of quinine are needed on the basis of 250 grains per case per year. The amount of quinine actually imported is often less than 2,000 kilograms a year, because the natives cannot afford to buy it.

"Refined quinine is, in fact, an expensive luxury, a rich man's remedy . . . Therefore, there is a very large field for the production of a still lower-priced product, such as totaquina . . . there is a potential market in the

Philippines alone for more than 30,000 kilograms a year. . . . It is required by malarious consumers who literally cannot afford to buy higher-priced drugs. . . . This estimated retail price of 20.43 pesos per kilogram of totaquina is higher than it would be if production were carried on commercially, but it compares very favorably with the present retail price of 154 pesos for quinine sulphate. . . . the totaquina could be sold to the people for something like one-seventh of the present price of quinine! In this case a 250-grain treatment would cost not 2.50 pesos, as at present, but only about 35 centavos, a price within the means of the malarious poor."

"Successful clinical trials were made by the authors at the Iwahig Penal Colony Hospital with totaquina prepared locally from *Ledgeriana* bark grown in the islands. W. F.

SERGEANT (André) & VOGT (P.). Essais thérapeutiques du "Totaquina" effectués à l'hôpital de Marengo (Alger).—*Arch. Inst. Pasteur d'Algérie*. 1935. June. Vol. 13. No. 2. pp. 205-209. With 2 figs.

SAINT-MARIE (Flye). Essais thérapeutiques du "Totaquina" effectués à l'hôpital Cocard, à Fez (Maroc).—*Arch. Inst. Pasteur d'Algérie*. 1935. June. Vol. 13. No. 2. pp. 210-215. With 5 figs.

PETER (F. M.). The Clinical Testing of Malarial Remedies.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. June 29. Vol. 29. No. 1. pp. 41-50. With 2 charts. [23 refs.]

The author's original observations, made in 1930, have been confirmed by experience.

The author was the first to test atebrin clinically; this he did at the Malaria Research Station, Gurbanesti, Rumania, in 1930 [this *Bulletin*, 1932, Vol. 29, p. 705]. "The present paper aims at showing how far these preliminary clinical tests on a few patients provided correct data regarding the scope of action of this drug." For the purposes of the original test two patients with benign tertian malaria and two with subtertian malaria contracted naturally were chosen, and also a third case of benign tertian which had been infected by inoculation. Films were made every three hours, and the parasites were counted against leucocytes. The observations concerning the action and non-toxic nature of atebrin which the author made in the course of these investigations have been abundantly confirmed in all parts of the world. "It differs fundamentally from quinine and plasmoquine in its longer retention in the body. . . . Atebrin is a dyestuff, and its action on the parasites is in all probability a direct one." Atebrin has a marked affinity for the parasites to which it becomes very firmly bound; on this account the amount required should be regulated by the number of parasites present rather than by the weight of the patient. Metabolism of the drug also plays a part in its action, and this can vary even in the same patient at different times. It was observed in the experimental laboratories at Elberfeld, some years ago, that foodstuffs containing large quantities of cellulose absorbed atebrin, and diminished its therapeutic effect. Quantities of food in the stomach are also said to hinder absorption. As regards individual prophylaxis: unlike quinine and plasmoquine, atebrin prolongs the incubation period, and 0.2 gram on 3 days of each week, or doses of 0.05 to 0.1 gm. daily, will give an effective clinical prophylaxis. W. F.

CARMAN (J. A.). **Atebrin, Plasmoquine and Quinine in the Treatment of Malaria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. July 31. Vol. 29. No. 2. pp. 191–202.

Subtertian infections should be treated immediately; it is vain to hope for the development of immunity against it in European cases. Atebrin is as effective as quinine, and costs no more.

The author states that the primary object of this investigation was to ascertain the relative merits of atebrin and quinine in the treatment of malaria in Kenya, but a large part of his paper deals with the importance of treating cases of subtertian infections as early as possible. In the third General Report of the Malaria Commission of the League of Nations (this *Bulletin*, 1933, Vol. 30, p. 837), it was stated that it is bad practice to begin the treatment of malaria infection at the commencement of the attack since this tends to prevent the development of an acquired immunity (see SINTON & HARBHAGWAN above). The author considers that it is dangerous to postpone treatment, and that to wait for a patient to develop immunity is to risk his life. He does not believe that Europeans ever develop a useful immunity to subtertian malaria. As regards the parallel series of cases treated with different drugs, he found that quinine and atebrin were equally efficient in eliminating parasites. "Atebrin is cheaper in European practice than is quinine, and although in treating Africans in hospital it appears to be less economical to use atebrin, it would almost certainly prove to be cheaper in the long run and in any case its use would enable a given number of beds to be utilised by 14 per cent. more patients."

[Most medical men in the tropics will agree that the treatment of subtertian malaria should begin at the earliest moment, but with regard to the report of the Malaria Commission it should be remembered that it dealt with the subject "from the point of view of persons who are in a position to obtain expert medical advice and efficient care rather than from that of the mass of the population of malarious countries."] W. F.

FARINAUD (E.). L'emploi de l'atébrine dans la prophylaxie collective du paludisme dans les exploitations agricoles.—*Ann. de Méd. et de Pharm. Colon.* 1935. Jan.–Feb.–Mar. Vol. 33. No. 1. pp. 136–139. With 1 chart.

DE LANGEN (C. D.) & STORM (C. J.). A Comparative Clinical and Experimental Study of the Action of Quinine, Plasmoquine and Atebrin.—*Meded. Dienst d. Volksgezondheid in Nederl.-Indie.* 1935. Vol. 24. No. 2. pp. 27–56. [31 refs.]

SOMASUNDRAM (S.). **Temperature Charts illustrating the Action of Atebrin Musonate Intramuscularly compared with Quinine Bihydrochloride Intramuscularly in the Treatment of Malaria in Ceylon.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. July 31. Vol. 29. No. 2. pp. 103–104.

The therapeutic effects of the two drugs were approximately the same. Toxic effects of atebrin by the mouth are not uncommon.

A single injection of 0.375 gram of atebrin was found insufficient to control the disease, and a standard treatment of two intramuscular injections with an interval of 24 hours has been adopted. Occasionally

it has been found necessary to give three injections. The fever and parasites disappear within 3 days. A control series was given two intramuscular injections of 15 grains of quinine followed by $22\frac{1}{2}$ grains a day by the mouth. The author states that he has not found atebirin musonate in any way superior to quinine. Atebrin injections are painless while quinine injections are painful. Atebrin by the mouth frequently causes epigastric pain; in children it may cause diarrhoea and vomiting. Symptoms of mental derangement lasting 2 or 3 days occurred in a "fair number" of the author's cases towards the end, or after the completion, of treatment. W. F.

VAN SLYPE (W.). Résultats cliniques obtenus par les atébrines dans le traitement du paludisme. [**Atebrin in Malaria.**]*—Bruxelles-Méd.* 1935. July 14. Vol. 15. No. 37. pp. 1003-1009.

Atebrin-musonate did not give very good results.

The author treated 54 patients with atebirin and he complains that he had to stop the treatment on several occasions because of vomiting and abdominal pains. [It appears more probable that these toxic symptoms were really due to the plasmoquine which was given with the atebirin.] In one case haemoglobinuria appeared after 0.9 gram of atebirin and 0.09 gram of plasmoquine had been given in three days. The atebirin was given in three forms (1) atebirin tablets, (2) atebirin powder for injection intravenously or intramuscularly, (3) atebirin musonate. A 10-centigram dose of atebirin powder dissolves readily in 5 cc. of water; it acts promptly; it is painless when injected and non-toxic. Atebrin musonate is still more soluble, 12.5 centigrams are soluble in 3 cc. of water. It is much slower in its action than ordinary atebirin. In some of the cases treated, schizonts were still present after 10 days. The author recommends that it should be reserved for the treatment of chronic cases. W. F.

HICKS (E. P.). **Atebrin Musonate : a Note on the Rate of Absorption and on the Local Effects of Intramuscular Injection.***—Records of the Malaria Survey of India.* 1935. June. Vol. 5. No. 2. pp. 203-206. [11 refs.]

"A single dose of atebirin musonate was found to have no injurious action on the tissues of monkeys when injected intramuscularly in the strength recommended by the makers."

Atebrin musonate is the methyl sulphonic acid salt of atebirin. Ordinary atebirin is the dihydrochloride. Atebrin musonate is sold as "Atebrin for injection" and must be distinguished from "Atebrin Tablets for Injection" which consist of the dihydrochloride. Atebrin musonate, a yellow powder, is packed in ampullae labelled 0.1 and 0.3 gram respectively. These figures represent the content in terms of the more familiar atebirin dihydrochloride. The actual weights of atebirin musonate are 0.125 and 0.375 gram. The makers recommend that one of the smaller ampoules should be used for intravenous injection, and one to three for intramuscular injection.

BLAZE and SIMEONS (this *Bulletin*, 1935, Vol. 32, p. 746) stated that they could control malaria by the intramuscular injection of one of the larger ampoules on each of two consecutive days. The author's experiments were made with *Silenus rhesus*. The drug was given by intramuscular injection to 8 monkeys, by intravenous injection to 4,

and by the mouth to 4. It appeared to be absorbed more quickly when it was injected. None of the monkeys showed any reaction at the site of injection except in one case where the solution was three times the strength recommended by the makers; in this instance local congestion, haemorrhage and oedema occurred. *W. F.*

AMY (A. C.). **Atebrin and Malaria.** [Correspondence.]—*Jl. Roy. Army Med. Corps.* 1935. Sept. Vol. 65. No. 3. pp. 212-215.

This letter is a criticism of a report on 4 cases of benign tertian which relapsed after treatment with atebrin (see BIGGAM, this *Bulletin*, 1935, Vol. 32, p. 745).

The author quotes a communication issued by Army Headquarters, India, on June 25th, 1934, on the results of atebrin-plasmoquine treatment from April 1st, 1933. Among 1,603 cases of benign tertian malaria 13.6 per cent. relapsed; among 628 cases of subtertian malaria 11.3 per cent. relapsed. A considerable proportion of these were doubtless fresh infections. Atebrin 0.3 gram daily was given for 5 or 7 days, and, then plasmoquine 0.03 gram for a further 5 days. In the case of Indian troops, subsequent to September 1933, the dose of plasmoquine was reduced to 0.02 gram and 0.01 gram on alternate days. The results with a 7-day course of atebrin were slightly better than with a 5-day course. In Bangalore, where there is no possibility of re-infection, 112 cases were treated and none of them relapsed within a period of 2 years. In the Annual Report of the Medical Transactions, 1934, Indian Military Hospital, Quetta, it was stated that all cases of malaria were treated with atebrin and plasmoquine, and that the relapse rate was only 2 per cent. There is absolutely no proof, the author says, that atebrin increases the toxicity of plasmoquine. [See reference above to Schulemann's statement at meeting of British Association.] *W. F.*

DE NUNNO (Renato). La stimolazione antimoniale del s.r.e. come mezzo terapeutico nella malaria estivo-autunnale chinino-plasmoquina-atebrin resistente. Nota preventiva. [**Antimony in the Treatment of Resistant Malaria.**]—*Riforma Med.* 1935. July 20. Vol. 51. No. 29. pp. 1087-1092. With 9 figs.

The author employed antimony injections with a view to stimulating the reticulo-endothelial system in patients suffering from malaria infection which had proved refractory to treatment by quinine, plasmoquine and atebrin.

He found that the intravenous injection of antimony tartrate markedly stimulated the r.e. system in rabbits and then tried this drug in cases of human malaria. Details of four are given. He used a 1 per cent. solution in doubly distilled water, sterilizing by heating to 100°C. for half an hour on three days. He gives on alternate days doses of 1, 2, 4, 6, 8, 10, 12 and 14 cc. Sometimes, if signs of intolerance of the larger doses appear, the advance from 9 cc. is more gradual, 10, 10, 11, 11, 12, 12, 13, 13, 14 cc. on alternate days. The early doses often bring about "a true mobilization of the parasites" with febrile attacks, but after the fourth or fifth injection the spleen becomes rapidly smaller and by the end of the course has become normal. One patient was unable to tolerate the complete course of antimony, but after he had received a total amount of 162.5 cgm. of the antimony

salt plasmoquin co. brought about a cure within 3 weeks. If the first course is not sufficient, a second starting at 10 cc. is given after 10-20 days' interval.

H. H. S.

HUFF (Clay G.). **Natural Immunity and Susceptibility of Culicine Mosquitoes to Avian Malaria.**—*Amer. Jl. Trop. Med.* 1935. July. Vol. 15. No. 4. pp. 427-434. With 1 fig. [12 refs.]

In this paper the author refers to his observations on the susceptibility of culex mosquitoes to infection with bird malaria which have shown that races derived from mosquitoes of low susceptibility tend to contain individuals of low susceptibility, while those derived from individuals of high susceptibility tend to contain individuals which are highly susceptible (this *Bulletin*, 1932, Vol. 29, p. 126). It is also pointed out that as the malarial parasite itself is bisexual the possibilities of the development of variations in it have also to be taken into account when considering the development in mosquitoes and other features of its life-history.

C. M. Wenyon.

MANWELL (Reginald D.). **How many Species of Avian Malaria Parasites are there?**—*Amer. Jl. Trop. Med.* 1935. May. Vol. 15. No. 3. pp. 265-282. With 49 figs. on 2 plates. [33 refs.]

This paper, which is in many respects similar to a previous one on the same subject by GIOVANNOLA (this *Bulletin*, 1935, Vol. 32, p. 122), reviews the present position of knowledge regarding species of avian malarial parasites. The conclusion reached is that though there may actually be more than seven species only this number have been sufficiently studied to make their existence as separate species certain. These fall into two groups, forms with rounded gametocytes (*P. cathemerium* and *P. praecox (relictum)*) and forms with elongate gametocytes (*P. circumflexum*, *P. elongatum*, *P. nucleophilum*, *P. rouxi* and *P. vaughani*). It is probable that *P. capistrani* and *P. wasielewski*, with round gametocytes, and *P. polare* with elongate gametocytes are also good species, while the specificity is questionable, owing to incomplete description, in the case of *P. biziuræ*, *P. fallax*, *P. major*, *P. majoris*, and *P. tumbayensis*. The paper contains a great deal of detailed information, while the synonymy of a number of names is discussed. Two of the forms, *P. nucleophilum* and *P. polare*, are new species. Two plates in black and white illustrate the characters of the various parasites.

C. M. W.

DEMIDOWA (L. W.). Ueber die geringste zur Erzeugung der experimentellen Malaria nötige *Plasmodium praecox* Zahl. I. Mitteilung. [The Smallest Number of *Plasmodium praecox* necessary to give rise to Malaria experimentally.]—*Giorn. d. Batter. e Immunol.* 1934. Nov. Vol. 13. No. 5. pp. 872-877. [19 refs.] English summary (4 lines).

By means of the micromanipulation and dark field observation of the blood corpuscles the author has been able to inject known numbers of malaria-infected red blood corpuscles into birds. With 50 corpuscles infected with *Plasmodium praecox* 20 birds were inoculated, with development of infection in 5 after 11 to 20 days. With 25 infected corpuscles 40 birds were inoculated, resulting in infection in 3 after

10 to 19 days. With 10 infected corpuscles 45 were inoculated, followed by infection in 2 after 11 to 21 days. With 5 corpuscles 30 were inoculated, followed by infection in 2 after 15 and 16 days. Finally 70 birds received only a single infected corpuscle, resulting in infection in 2 after 14 and 52 days. In another experiment 4 birds received a single corpuscle infected with *P. cathemerium*. Of these one became infected after 5 days. The experiments with *P. praecox* show that by reducing the dose of infective material the normal incubation period of 5-7 days became prolonged to 10-52 days. It is admitted that in these experiments each infected cell may have contained more than one parasite, as it is not possible to distinguish multiple infections from single ones by means of the dark field microscope. C. M. W.

LEGROUX (R.) & LWOFF (André). La schizogonie régressive des gamétocytes femelles d'*Haemoproteus paddae*. [**Regressive Schizogony of the Female Gametocyte of *H. paddae*.**]*—Bull. Soc. Path. Exot.* 1935. Apr. 10. Vol. 28. No. 4. p. 277.

In 1924 the authors saw appearances in *Haemoproteus paddae* of the Java sparrow which they interpreted as the much disputed schizogony of the female gametocyte. Subsequently the discovery of *Plasmodium paddae* in the same host suggested to BRUMPT (this *Bulletin*, 1935, Vol. 32, p. 659) that the forms of the *H. paddae* resembling schizogony were actually schizonts of *P. paddae*. The authors now refute this suggestion, though they rightly point out that experimental work alone will finally settle the question. C. M. W.

COATNEY (G. Robert). **The Effect of Atebrin and Plasmochin on the *Haemoproteus* Infection of the Pigeon.***—Amer. Jl. Hyg.* 1935. Mar. Vol. 21. No. 2. pp. 249-259.

Both atebrin and plasmoquine were tested on *Haemoproteus columbae* of the pigeon the infections employed being the primary ones contracted naturally in the dove-cote. The tolerated doses of the drugs given orally were 40 mgm. of atebrin and 10 mgm. of plasmoquine a day. The conclusion reached is that atebrin inhibits the growth of the young gametocytes and prevents their maturation for at least 55 days. Though the adult gametocytes are altered morphologically atebrin removes them with difficulty. On the other hand plasmoquine does not prevent the development of the gametocytes for more than 15 days but rapidly brings about the disappearance of the adult gametocytes. Neither drug appears to have any effect on the schizonts as judged by the regular occurrence of relapses. C. M. W.

SINTON (J. A.). **The Malarial Parasites of the Oriental Monkey *Silenus irus*.***—Reprinted from Current Science.* 1934. Aug. Vol. 3. No. 2. pp. 48-50.

As has been noted in various other papers, the work carried out by Sinton and his colleagues under the Malaria Survey of India has shown that the oriental monkey, *Silenus irus*, is liable to infection with three species of malarial parasite, all of which are easily transmissible to *Silenus rhesus* by blood inoculation. These parasites are *P. knowlesi*, Sinton & Mulligan, 1932 (24-hour cycle), *P. cynomolgi*, Mayer, 1907 (48-hour cycle) and *P. inui*, Halberstadter & Prowazek, 1907 (72-hour cycle). It is noted that pure infections of these are being maintained at the laboratories at Kasauli. C. M. W.

GHOSH (B. N.) & SINTON (J. A.). **Quantitative Changes in the Proteins of the Blood Sera of Monkeys Infected with Malarial Plasmodia.**—*Records of the Malaria Survey of India*. 1935. June. Vol. 5. No. 2. pp. 173–202. With 6 graphs. [47 refs.]

The authors, after discussing the work of various observers on the subject of the proteid changes which occur in the serum in human malaria, conclude that the results indicate that malarial attacks cause a distinct fall in total blood proteids, which is most marked in the albumin fraction. Though there seems to be some doubt regarding the globulin fraction there is a general consensus of opinion that the globulin albumin ratio is raised. After the attack there is a tendency for the proteids to return to their normal level. In chronic infections the same changes occur but are less marked. In order to gain further insight into the question it was decided to investigate the blood changes in monkey malaria infections caused by *Plasmodium knowlesi*, *P. cynomolgi* and *P. inui*. The general results indicate a close parallel to what has been found in human malaria. It is noteworthy that the changes are more pronounced with the more acute *P. knowlesi* infection than with the other milder ones. The return of the blood to normal after an attack appears to be accelerated by treatment with quinine, atabrin, plasmoquine or stovarsol. It seems that the disturbance is the result of the effect of the infections on the reticulo-endothelial system.

C. M. W.

GERACITANO (Arturo). **Ulteriore contributo allo studio dell'emozoina malarica.** [Further Contribution regarding Malarial Haemozoin.]—*Riforma Med.* 1935. July 13. Vol. 51. No. 28. pp. 1058, 1061–1062. With 5 figs. [17 refs.]

The author continues his study of the optical and chemical characters of malaria pigment. He shows that in all three forms (not in *P. vivax* infection only), with crossed Nicol prisms near and between the doubly refractile granules there are others optically inactive and he has proved that these consist of the same pigment. Subjection of the pigment to the action of alcohol, peroxide of hydrogen or hydrochloric acid does not change the double refractivity. It is worthy of note, he states, that malarial pigment, which is optically active to polarized light is related to and resembles the haemin crystals of blood.

H. H. S.

JACKSON (R.). **Sur deux cas d'infection naturelle par l'hématozoaire du paludisme, de *A. splendidus* (*A. maculipalpis*) dans la colonie de Hong-Kong.** [The Natural Infection of *A. splendidus* (*A. maculipalpis*) in Hong Kong.]—*Bull. Soc. Path. Exot.* 1935. June 12. Vol. 28. No. 6. pp. 446–448.

The author has found two specimens with gut infections; one with 15 cysts of about 10 μ diameter, the other with 12 measuring about 40 μ . They were caught in a construction camp at Shing-Mun, on the mainland, where the rate of infection of the principal carriers was very high. The figures were as follows:—

A. minimus, examined 2,155, infected 12.48 per cent.; *A. jey-porensis*, examined 10,936, infected 9.93 per cent.; *A. maculatus*, examined 230, infected 3.48 per cent.; *A. hyrcanus*, examined 2,818, infected 1.21 per cent.

W. F.

MATHIS (Maurice). Cycle biologique complet d'*Anopheles gambiae* Giles élevé en série au laboratoire. [**The Complete Life-Cycle of *Anopheles gambiae* realized, in the Laboratory.**—C. R. Soc. Biol. 1935. Vol. 119. No. 27. pp. 1385–1386.]

The author bred *A. gambiae* in small cages measuring only 18 × 18 × 25 centimetres. The water for the larvae was rich in *Protococcus* and was further enriched with a sterile culture of *Euglena viridans*. The eggs hatched in 36 to 40 hours; the larvae became pupae in 5 to 8 days; adults appeared 24 hours later; fecundation took place quite readily in the small cages on the same evening; the females were ready to bite almost at once; the first eggs were deposited about 6 hours after the feed. The whole cycle from egg to egg occupied about a fortnight. The author has successfully carried on a strain of *A. gambiae* at Dakar, in Senegal, through 5 generations, between 29th April and 14th July 1935. The temperature was 24–26°C. This has provided him with several thousand mosquitoes. W. F.

BOYD (Mark F.), STRATMAN-THOMAS (Warren K.) & KITCHEN (S. F.). **On the Relative Susceptibility of *Anopheles quadrimaculatus* to *Plasmodium vivax* and *Plasmodium falciparum*.**—*Amer. J. Trop. Med.* 1935. July. Vol. 15. No. 4. pp. 485–493.

When the gametocyte density is high, *Anopheles quadrimaculatus* can be infected in approximately the same degree with either *P. vivax* or *P. falciparum*; but when the gametocyte density is low, infection with *P. vivax* occurs more readily. One male and one female gametocyte to 100 leucocytes marks the nominal practical limit for the infection of *A. quadrimaculatus* with *P. vivax*, but the minimal density in the case of *P. falciparum* is 11 gametocytes of each sex to 100 leucocytes. The authors "incline to the opinion that the differences noted may more properly be attributed to characteristics of the parasites themselves than to a differential susceptibility on the part of *A. quadrimaculatus*." W. F.

DE BUCK (A.). **Infection Experiments with Quartan Malaria.**—*Ann. Trop. Med. & Parasit.* 1935. July 17. Vol. 29. No. 2. pp. 171–175. [10 refs.]

A fair percentage of gland infections was obtained with one batch of *A. maculipennis*, the results with other batches were very poor.

These experiments were carried out in Amsterdam with a quartan strain obtained from Vienna. Wild *A. maculipennis* var. *atroparvus* which had been caught in stables were fed on two patients who had been inoculated with this strain. The number of male gametocytes in the blood at the time of feeding was 6 per 500 leucocytes, or somewhat over the density of 1 per 100, which the author considers the minimum concentration for practical use. The result was unexpectedly successful for out of 45 mosquitoes which were dissected 12 showed gland infections. The experiment was repeated several times, but the same good results were not obtained. In one batch, 5 gland infections were found in 56 mosquitoes dissected, but in other batches there were no infections beyond a few oöcysts in the gut. "The only reasonable explanation seems to be that the number of gametocytes in the patient's blood was sufficient, but that the bad results in the

other mosquitoes are caused by something in the physiology of their stomachs." Experiments made with *A. bifurcatus* gave the same bad results. The extrinsic incubation was 15 days, the intrinsic incubation, in man, was 25 days. "The Vienna strain of malaria quartana develops only in rare cases a sufficient number of gametocytes to infect mosquitoes successfully." W. F.

BISHOPP (F. C.). **Mosquito Control Work of To-day.**—*Jl. Econom. Entom.* 1935. June. Vol. 28. No. 3. pp. 620-627.

While passing reference is made to other parts of the world in which effective mosquito control has been carried out, this paper is concerned with what has been done in the United States of America, where in certain areas the problem has been tackled in a wholesale manner under Federal or State supervision and support. Non-malaria-carrying as well as malarial mosquitoes have received attention, the former in 32 States and the District of Columbia, the latter in 14 States. The assumption by the Civil Works Administration in December, 1933, of responsibility under both headings gave a great stimulus to operations, which in "nearly all the Southern States" had already been in progress for a long time. That extensive mosquito control may also afford at least temporary relief to unemployment is shown by the fact that, in the 14 States already mentioned, the monthly average of men employed for some 4 months in ditching and draining was 64,000, while "The maximum number of labourers at work during any week of this period was 120,000."

The author pleads for further research into the bionomics and ecology of mosquitoes, as also their relation to virus diseases, such as encephalomyelitis, in man and animals. E. E. Austen.

- i. DE BUCK (A.) & SWELLENGREBEL (N. H.). **The Salivary Glands in Hibernating *Anopheles maculipennis* var. *messeae* and Semi-hibernating *Anopheles maculipennis* var. *atroparvus*.**—Reprinted from *Proc. Roy. Acad. Amsterdam*. 1935. Vol. 38. No. 4. pp. 452-454. With 3 figs. on 1 plate.
- ii. ——— & ———. **Further Studies on, and Discussion of the Results of Crossmating the Races (Varieties) of *Anopheles maculipennis*.**—*Ibid.* No. 5. pp. 553-558. With 6 figs. on 2 plates.

i. In villages to the north of Amsterdam, in attics wherein people sleep, both varieties mentioned in the title occur in autumn and winter, *messeae* because of the lowness of the temperature in such places, *atroparvus* on account of the facilities for feeding. Once there, *messeae* remains fasting, while *atroparvus* takes a meal of blood at intervals. Thus, though the environment is the same, the two varieties behave differently. Examination of the salivary glands affords a means of identification. In *messeae* the glands are typically "rod-shaped," and frequently contain masses of needle-like crystals in the lateral lobes; in typical *atroparvus* the glands are "club-shaped," and devoid of crystals.

ii. In order to check the results described in a previous paper [this *Bulletin*, 1935, Vol. 32, p. 137], the authors repeated their experiments in crossmating the varieties of *A. maculipennis* which occur in Holland, namely *atroparvus*, *messeae* and *typicus*, using adults reared in Amsterdam from ova collected in Sweden. These "responded to

attempts at hybridisation in exactly the same manner as specimens collected in Holland and in Italy." Crossing (both ways) *atroparvus* and *messeae*, and crossing female *atroparvus* with male *typicus* did not result in viable larvae. On the other hand, by crossing male *atroparvus* with female *typicus* there was produced a first filial generation, which was sterile.

E. E. A.

DE BUCK (A.) & SWELLENGREBEL (N. H.). **On the Seasonal Longevity of *Anopheles maculipennis* in Holland with Reference to their Ability to act as Malarial Vectors.**—Reprinted from *Proc. Roy. Acad. Amsterdam*. 1935. Vol. 38. No. 3. pp. 335–343. With 3 diagrams.

The scarcity of summer infections in anopheles is not due to stabular attraction only, but also to the short life of summer generations. Heavily infected mosquitoes live the shortest time.

JAMES, NICOL & SHUTE have shown that the early summer is not favourable to malaria transmission, because it is not favourable to the longevity of infected anopheles. It is not favourable to their longevity because this is a period of sexual activity which endangers life by ovulation and long flights. It was formerly thought that the difficulty of finding anopheles in houses in Holland during the summer was due to their being attracted to stables; JAMES's observations admit of a different interpretation.

Observations made by the authors gave results which agreed with those of JAMES. "A favourable season from September till December (rate of survival 59 per cent.), an unfavourable one from April till August (rate of survival 15 per cent.), joined by a period of transition in January–March (rate of survival 32 per cent.). The sporozoite rates of anopheles infected within these three periods are about the same, *viz.*, 74, 70 and 71 per cent. respectively. So the summer mosquitoes are indifferent malaria vectors not because they are bad carriers but because they are too short-lived." Except in the winter months laboratory-bred mosquitoes live much longer than wild ones. The latter are weakened by the wear and tear of an outdoor life during the period of sexual activity. This confirms JAMES's views on the special importance as malaria vectors of anopheles protected from the dangers of an outdoor life. The author found "that there exists a greater mortality in heavily infected mosquitoes than in slightly infected ones. Whatever the cause may be of this increased mortality it is acting only during the unfavourable season of February–August and it affects the mosquitoes suffering from a salivary infection. Intestinal infection alone, however severe, does no apparent harm."

W. F.

GALLIARD (H.) & SAUTET (J.). Nouvelle contribution à l'étude de l'anophélisme en Corse. Les variations saisonnières de l'indice maxillaire. [**Anophellism in Corsica: the Seasonal Variations in the Maxillary Index.**]—*Bull. Soc. Path. Exot.* 1935. June 12. Vol. 28. No. 6. pp. 453–456. With 2 figs. on 1 plate.

In Corsica by far the most important vectors of malaria are *Anopheles maculipennis* var. *labranchiae* and *A. sacharovi* (*A. elutus*), which in certain parts of the island exhibit seasonal instability as regards the maxillary index. During the summer, when malaria is epidemic, the

mean maxillary index was found to be between 12 and 14, whereas in winter, in two successive years, it fluctuated between 13 and 16. Such variation would seem to be connected with changes in the breeding places, partly seasonal, partly (in one instance) due to pumping. As already remarked by ROUBAUD, with regard to the race of *A. maculipennis* in Vendée whose zoophily is unstable:—"a rise in the mean maxillary index corresponds to the diminution of water surfaces; conversely, the lowering of the index will be related to a marked extension of the latter. . . ." In September, when breeding places exhibit their maximum reduction before the first rains, competition among larvae is intense, and it is possible that the only individuals to complete their development will be such as are stronger than their fellows; hibernating females thus produced will, according to ROUBAUD's hypothesis, have a high maxillary index. In Holland, on the other hand, according to DE BUCK, SCHOUTE & SWELLENGREBEL, the reverse is the case, and a rise in the maxillary index is observed when the winter generation gives place to that of summer; this difference, however, may be partly climatic, and partly due to the fact that the Dutch races of *A. maculipennis* all have a very high maxillary index, besides contrasting with the southern races in many biological respects. An unstable anopheline fauna, whose reactions, in default of prolonged study, cannot be foreseen, is dangerous. Where such exists in a malarious region, hasty and incomplete interference with water-surfaces may be inadvisable. E. E. A.

WASSILIEFF (A.). Étude de quelques gîtes d'anophèles tunisiens. [Some Breeding Places of Tunisian Anopheles.]—*Arch. Inst. Pasteur de Tunis*. 1935. Apr. Vol. 24. No. 2. pp. 352-359.

The author has studied and made collections in two permanent *Anopheles* breeding places in Tunis. In one, part of the Oued Bezirck, the water is fresh, the mosquito is *A. maculipennis*, and its larvae were found in abundance among an aquatic plant community consisting of seven species, the names of which are given. In the other, the Bekalta drains, the water is brackish, the mosquito is *A. hispaniola*, and the plant association consists of only three species, which are different from those in the Oued Bezirck. The single feature common to the two plant communities is that their leaves are finely divided, so that they form a network in the water. In the localities mentioned, the antilarval campaign should concentrate on the eradication of aquatic plants; the suppression of amphibious plants, growing along the edge of the water, is less important, and oiling should follow the uprooting of the others. The finding of larvae of *A. hispaniola* in different stages of development during November and December indicates the advisability, where this mosquito occurs, of not discontinuing antilarval measures even in winter. E. E. A.

SERGENT (Etienne). Quelques remarques sur les espaces intercostaux et les columelles des oeufs d'*Anopheles maculipennis*. [The Intercostal Spaces and the Columellae in the Eggs of *Anopheles maculipennis*.]—*Arch. Inst. Pasteur d'Algérie*. 1935. June. Vol. 13. No. 2. pp. 184-187. With 17 figs. on 5 plates.

The author has examined, compared and photographed samples from 144 batches of eggs of Algerian *A. maculipennis* var. *labranchiae*, and has similarly studied eggs laid by French representatives of vars.

atroparvus and *messeae*, as furnished by 162 batches produced by the former, and three deposited by the latter, in Limousin and Cantal. The brief paper under review provides a commentary on the excellent, untouched photographs with which it is illustrated. In the determination of the varieties of *A. maculipennis*, HACKETT & MISSIROLI have attached a certain importance to the appearance of the intercostal membrane in the floats on the eggs; and the forms of wrinkling of this membrane exhibited by the varieties mentioned above are displayed in the plates. As is only to be expected, the markings in question do not provide absolutely distinctive characters, and in eggs of var. *atroparvus* the intercostal spaces may be either wrinkled or smooth. On the other hand, photographs of portions of the under-surface of the egg-floats in the same variety and in var. *labranchiae* show a similar kind of network, formed by longitudinal wrinkles. The illustrations of the columellae (or, as the author would prefer to term them, the *papillae*) in the eggs of vars. *labranchiae* and *atroparvus* agree with the descriptions in "Instructions for the Determination of the Varieties of *Anopheles maculipennis*," issued by the Malaria Commission of the League of Nations. E. E. A.

- i. COLLIGNON (E.). Quelques observations sur le comportement des anophèles dans leurs abris diurnes en Algérie. [**The Behaviour of *Anopheles* in their Diurnal Shelters in Algeria.**—*Arch. Inst. Pasteur d'Algérie*. 1935. June. Vol. 13. No. 2. pp. 188-191.]
- ii. —. Observations sur les gîtes à anophélines dans le département d'Alger en 1934. [**Anopheline Breeding-Places in the Department of Algiers, in 1934.**—*Ibid.* pp. 192-200. With 1 chart.]

- i. With the object of testing the effect of antilarval measures, and in order to secure specimens for laboratory purposes, the author, in 1934, paid frequent visits to certain dark cow-sheds in the vicinity of Halloula Lake and Rhégaïa Marsh, important breeding-places of *Anopheles maculipennis*. In these shelters, untenanted by day, the insects were found resting on the underside of roofing tiles, on rafters, or on the upper part of the walls, especially, as so often happens, on dusty cobwebs. Almost all were females, gorged with blood, and eggs subsequently deposited were exclusively of the *labranchiae* type. Males, seen rarely at the beginning of spring, were never met with again, even though the breeding-places were but a few hundred metres away. No *Anopheles* were found among vegetation in the surrounding open country. As in the British Isles, a summer and an autumn brood would appear to be produced; individuals belonging to the former were found from the latter end of May or beginning of June until August, while those of the autumnal series were in occupation of the sheds from the commencement of October until the end of the following month or even of December. At the outset of the hot weather as also in autumn, the insects were found chiefly in the upper parts of the cow-sheds, near the roof; at the end of June, when they were most numerous, they extended on to the walls, but did not descend lower than about 1½ metre from the ground. With a damp sea-breeze from the north-east the shelters were well occupied; on the other hand, when the sirocco, the dry wind from the south, was blowing, it was seldom that even a few insects could be found, and the sheds were deserted for some time afterwards. In June, at the beginning

of the hot weather when the sun was most powerful, captures could be made with ease ; but in December the insects seemed more wide-awake, and frequently took flight so soon as a beam of light fell upon them.

ii. The year 1934 in Algeria was marked by an abnormal rainfall, resulting in a considerable extension of permanent *Anopheles* breeding-places, and an unusual persistence of temporary ones. Details are given with regard to breeding-places of *Anopheles marteri*, *A. bifurcatus*, *A. hispaniola*, *A. maculipennis* and *A. algeriensis*. The early stages of the last-mentioned species had not previously been met with by the author, but in 1934 he took larvae and pupae in two different localities near the seashore.

In the case of *A. maculipennis* breeding began very late, and it was not until the beginning of June that the first larvae were found, the influence of the water régime being shown by the fact that captures were made at about the same time in all districts. Generally speaking, larvae persisted until the end of November, and a breeding place on the seashore, which had formed again in the autumn, still contained larvae at the close of December. In 1934, larvae of *A. maculipennis*, often alone but sometimes associated with those of other species of the genus, were encountered in almost every breeding place examined.

E. E. A.

DE MEILLON (Botha). **Entomological Studies. Studies on Insects of Medical Importance in South Africa—Part II.**—*Publications of South African Inst. Med. Res.* 1935. Mar. Vol. 6. No. 35. pp. 323-365. With 10 plates.

The first portion of this paper is concerned with Simuliidae. There follows, after records of mosquitoes found in the Cape Province, an account of experiments with *Anopheles funestus*, an "essentially anthropophilic" species. When a native in an infested area was made to pass the night in an open-ended, mosquito-proof tent, through which a gentle breeze was caused to blow, 60 *A. funestus* were caught on the gauze protecting the leeward end, but none on that covering the other, showing that the insects found the host by smell. Two further series of similar experiments, each lasting eight days, during which the native was receiving doses of sulphur with the object of disguising his odour, showed that "the ingestion of sulphur, some of which is excreted through the skin, and so presumably disguises the body odour of the host," reduced the number of *A. funestus* which visited the tent in order to feed. When the host, after being carefully deodorized, was sprayed with caprylic alcohol, "apparently an essential feature of goat odour," before being placed in the experimental tent, *A. funestus* ignored his presence for three successive nights ; and the simple deodorizing of the host with odourless soap and water, followed by the application of weak hypochlorite solution, proved nearly as effective, the total bag of *A. funestus* on three successive nights being in this case 11 in the experimental as compared with 69 in the control tent. The author's conclusion is that immunity from mosquito bites may possibly be secured either by the application of "some odourless substance" (thus avoiding the use of strong-smelling and to some people objectionable citronella), or by ingestion of something "which, when excreted through the skin, will neutralize the body odours without giving the body an additional smell."

In a brief concluding section anatomical and bionomical reasons are given for thinking that *A. funestus* subsp. *leesoni* is really a distinct species, which on the other hand, as shown by certain adult and larval characters, is also distinct from the Oriental *A. fluviatilis*. E. E. A.

- i. TREILLARD (M.). Domesticité périodique et périodicité de la pullulation chez les anophèles extrêmes-orientaux. Remarques sur ses modalités, ses causes et son utilisation. [**Periodic Domesticity and Abundance of Far Eastern Anopheles: their Characteristics, Causes and Utilization.**—*Bull. Soc. Path. Exot.* 1935. June 12. Vol. 28. No. 6. pp. 448–450.
- ii. ——. Influence des facteurs externes sur la biologie des larves d'anophèles. I. Surface, volume, profondeur de l'eau et développement des larves de *Pseudomyzomyia subpicta*. [**Influence of External Factors on the Biology of Anopheline Larvae. I. Surface, Volume and Depth of Water, and the Development of Larvae of *Anopheles subpictus*.**—*Ibid.* pp. 451–452.

i. One of the chief objections likely to be urged against an anti-adult mosquito campaign is that it can only affect a relatively limited number of insects, representing at best a more or less important fraction of the total anopheline population. But, unless hopes are vitiated by wholesale outdoor migratory movements of adult anophelines, it should be possible, by choosing the moment or moments when the numbers of domestic mosquitoes are lowest, to effect what will amount to a large-scale destruction of the anopheline population. In the case of *Anopheles minimus*, which is so formidable a vector of malaria in the Far East, migrations of the character referred to have not yet been demonstrated. In view, therefore, of its domesticity, anthropophily, and individual longevity, and of the duration of the period when it is on the wing, it can be attacked with success indoors while its numbers are relatively low, although, as already pointed out by the author [this *Bulletin*, 1931, Vol. 31, p. 719], owing to the nature of its breeding-places antilarval measures against it may be difficult.

ii. Among the various kinds of breeding places selected by *A. subpictus*, which is fairly widely distributed in the Far East, small household collections of water are most frequently chosen. The author has noted the results of placing twenty young larvae of this species separately in each of four series of small containers, the respective diameters of which were 1.5, 1.5, 9 and 9 cm., and the heights 0.5, 4, 0.5 and 4 cm. Not only the exposed surface and the depth of water thus varied, but also the volume, the latter ranging from some 2 cc. in the smallest receptacles to about 100 cc. in the largest. Other conditions, including temperature and food-supply, were the same throughout. Results, to be published in detail later, are given in concentrated form, and it is noted that the same type of rearing receptacle did not prove equally favourable to both pupae and larvae, either as regards number developing or time occupied: Receptacles belonging to Series I, *i.e.* the smallest, produced the largest number of adults in the shortest time, and were closely followed in this respect by Series III. It would seem that the experimental results described, which show the benefit arising from the disposition of a certain quantity of water, are in accordance with conditions observed fairly often in the natural breeding places of *A. subpictus*. E. E. A.

SOESILO (R.). **The Hyrcanus (Sinensis) Problem in Java. (Preliminary Report.)**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1935. Vol. 24. No. 2. pp. 68-71.

This concerns the important part played by *A. hyrcanus* in an epidemic on the Pamanoolean and Tjrasern lands near Soembang, in Java. WALCH was the first to describe a *hyrcanus* epidemic; it occurred on the east coast of Sumatra in 1921. In some parts of the interior it is the most important carrier. WALCH subjected specimens from various parts of the archipelago to the precipitin test. He found that about 85 per cent. contained human blood and that the presence or absence of cattle made little difference. [See SWELLENGREBEL above, where it is stated that *hyrcanus* is not a carrier in the rice fields of Java, though it is present in great numbers.] W. F.

BAISAS (F. E.). Notes on Philippine Mosquitoes, II. *Uranotaenia* Group. —*Philippine Jl. Sci.* 1935. May. Vol. 57. No. 1. pp. 63-80. With 4 plates & 1 fig. [27 refs.]

BAISAS (F. E.). Notes on Philippine Mosquitoes, III. Genus *Culex*: Groups *Lophoceratomyia*, *Mochthogenes*, and *Neoculex*. —*Philippine Jl. Sci.* 1935. June. Vol. 57. No. 2. pp. 167-179. With 2 figs. & 4 plates. [20 refs.]

HINGST (Hans E.). A Note on making Permanent Preparations of Anopheline Mid-Guts. —*Amer. Jl. Hyg.* 1935. Sept. Vol. 22. No. 2. pp. 278-282. With 5 figs.

LING (L. C.). **Field Observations on Malaria Control Measures in Singapore and Java.**—*Chinese Med. Jl.* 1935. June. Vol. 49. No. 6. pp. 562-569. With 9 figs.

The antimalaria budget for Singapore Municipality is given, and the method of controlling malaria in the rice fields of Java is described.

With the help of a fellowship given by the League of Nations, the author attended the malaria course arranged by the Health Organization of the League at Singapore in 1934. The course lasted two months; it consisted of laboratory work and practical field study and was attended by 27 students who were divided into two parties, one of which studied field work in Malaya and the other in Java. The author describes his experiences in Singapore and Java. The budget for antimalaria work in the municipal area of Singapore, for the year 1934, was 71,150 Straits dollars (£8,300) of which \$43,685 was for coolies' wages, \$20,335 for equipment and materials, \$7,130 for salaries of inspectors. The municipal area has a radius of 5 miles with a population of about half a million. In Java, the malaria of rice fields is carried by *A. aconitus*; in Sumatra, it is carried by *A. hyrcanus* var. *sinensis*. The incidence of these mosquitoes has been reduced by attention to the grass and the water. The period of irrigation has been shortened; the inlet and outlet of water has been better controlled; the farmers are allowed to plant only one crop of rice instead of two, and that must be done at a fixed time during the wet season; they are made to keep the irrigation ditches free from grass. Free quinine is distributed during epidemics. These measures have achieved remarkable success; in the Tjihea Plain of Western

Java, where rice fields had been abandoned because of their unhealthiness, the spleen index has dropped in 3 years from 100 per cent. to almost nothing, the population has increased by 30 per cent., and a rice of better quality which sells at a higher price has been produced. The author also describes the methods by which breeding in fish ponds is controlled. (See this *Bulletin*, 1935, Vol. 32, p. 729, and 1930, Vol. 27, p. 640.) W. F.

GINSBURG (J. M.). **Mosquito Larvicides.**—*Proc. N. J. Mosq. Ext. Assoc.* 1934. p. 121. [Summarized in *Dept. Scient. & Indust. Res. Water Pollution Research. Summary of Current Literature.* 1935. Sept. Vol. 8. No. 9. pp. 297–298.]

"A stable stock emulsion suitable for use as a larvicide in fresh waters and waters of less than 5 per cent. salinity is prepared by emulsifying a mixture of kerosene-pyrethrum extract (obtained by treating 2 lb. pyrethrum flowers with 2 gal. kerosene), 1 gal. water, and 8 oz. 40 per cent. liquid coconut oil soap. The emulsion mixed with 10 parts of water kills mosquito larvae but is not injurious to fish, plants or water fowl. The pyrethrum does not remain toxic after 48 hours. An emulsion suitable for use on waters of more than 5 per cent. salinity is prepared by adding a mixture of 2 oz. cresylic acid and 2 gal. kerosene-pyrethrum extract to a mixture of 1 lb. powdered skim milk in 1 gal. water. Diluted with 10 parts water, this larvicide has no effect on goldfish and water fowl but causes slight injury to young leaves of aquatic plants. Both larvicides are equally effective against mosquito pupae and larvae when used at a rate of 50 gal. or more per acre. On account of insufficient spreading and penetration, the pyrethrum larvicides are less effective than oil on waters covered with vegetation and debris, filter beds heavily charged with sewage and scum, salt water covered with scum and places where the more permanent effect of oil is necessary; under other conditions they are as effective as oil. Soap in a concentration of 0.2 per cent. or more completely destroys mosquito larvae and pupae."

RIMBAUT (G.) & MATHIS (Maurice). Utilisation des "poissons millions" pour la lutte biologique contre les larves d'anophèles à Dakar. [**The Successful Employment of "Millions" at Dakar.**]—*Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 575–577.

These small fish are native to the northern part of South America and the Lesser Antilles. They are very small, the females measuring only 5 cm., and they are very prolific and bring forth 30 to 60 young every month which themselves attain to maturity a couple of months later. Conditions at Dakar are favourable to these little fish, and three couples brought from the Pasteur Institute in Paris multiplied rapidly. Dakar is surrounded with vegetable gardens containing innumerable wells which, however useful they may be to the market-gardeners, serve as a chain of anopheline breeding-places round the settlement. Ten fish were put into one of these wells, a shallow pool excavated in the sandy soil, and the contents of 10 dips of the net were counted daily. On the first day, there were 1,500 larvae and 10 fish; on the fourth, 604 larvae; on the fifteenth, 205 larvae;

on the twenty-ninth, 0 larvae and about 600 fish. The gardeners welcome the use of "millions" in preference to oiling, and it is cheaper.
W. F.

DEARBORN (F. E.). **Homologs of Paris Green. I. Lower Members of Acetic Acid Series.**—*Jl. Econom. Entom.* 1935. Aug. Vol. 28. No. 4. pp. 710-714.

Copper aceto-arsenite, or Paris green, has been a commercial product for nearly a century. Its principal use prior to 1870 was as a pigment. It came into wide use for poisoning the Colorado potato-beetle and other insects before the introduction of lead arsenite as an insecticide. In 1906 Avery prepared a series in which formic, propionic, butyric, monochloroacetic and trichloroacetic acids were substituted for acetic acid. His conclusions were that Paris green and its homologues were compounds of copper meta-arsenite and the copper salt of the acid used, in which the ratio most frequently approached 3 to 1. The analyses made by the author show that Paris green and its homologues are definite compounds of copper meta-arsenite and the copper salt of the corresponding acid, and that the ratio of the two constituents is very close to 3 : 1 in all cases.
W. F.

WINCKEL (Ch. W. F.). *Die Praxis der therapeutischen Malaria.* [**Malarial Therapy.**]—Reprinted from *Psychiatrische en Neurologische Bladen.* 1935. No. 3. 20 pp. With 14 charts. [13 refs.]

An account of malaria therapy as practised in Amsterdam. The author is the malaria consultant to the Psychiatric Clinic at Amsterdam. He gives a clear account of the methods employed there for malaria therapy. These do not differ much from those now generally employed. One or two points may be referred to. In order to damp down the symptoms of the infection when they tend to get out of hand, but not to kill off all the parasites, an injection of a small dose (150 mgm.) of neosalvarsan is recommended. They have now abandoned the use of provocatives or "stimulants" of the malarial infection, adrenalin, etc., as being unnecessary when systematic blood examinations are being carried out. The importance of regular blood examinations is rightly stressed. As the number of cases of general paralysis of the insane is limited in Amsterdam itself he considers that it would improve the organization and facilities for investigation if cases in the north and south province of Holland and Utrecht were included in the scheme. Amsterdam acts as a centre for distributing malarial blood to various clinics in Holland.
E. D. W. Greig.

REVIEWS AND NOTICES.

McKINLEY (Earl Baldwin) [M.D., etc.]. **A Geography of Disease. A Preliminary Survey of the Incidence and Distribution of Tropical and Certain Other Diseases.** Supplement to *Amer. Jl. Trop. Med.* 1935. Sept. Vol. 15. No. 5. pp. xxv+495.

This Survey was made possible by a grant from the American Leprosy Foundation to the Division of Medical Sciences of the National Research Council, U.S.A., and is dedicated to the memory of Theobald SMITH, who was one of an advisory Committee of three. The author is Director of Studies to the Division. One of the objects is stated to be to give impetus and encouragement to the development of the field of tropical medicine by both lay and professional interests. Statistical data from tropical and subtropical countries in all parts of the world are presented in tabular form, supplemented by sketches of the social-economic background of each area, for which acknowledgment is made to the "Statesmen's Yearbook." These tables and letterpress make up the bulk of the survey. They are followed by short essays on 18 selected diseases, regarded as world problems, by American authorities, with statistical summaries and references and by an Appendix of comments on various subjects from different parts of the world which were unsuited for inclusion in the body of the survey.

A survey such as this might be based on a study of the reports issued by Governments and Institutions or by a questionnaire circulated to medical departments or individuals in the areas from which information was desired. From many areas, however, reports are not available and when such are issued the differences in their form and method of presentation make comparison difficult if not impossible, and it is the questionnaire which has been here adopted. This is in two parts: 1. Tropical Diseases. 2. Diseases usually considered as of Temperate Climates. In the first list there are 80 entries, and many of these have sub-heads. The second list contains 32 entries.

Following the column of disease headings are five blank columns, for the presence or absence of the disease, its distribution, number of cases, vector or intermediate host, and whether considered important in public health or not.

No two authorities or even authoritative committees would be likely to agree on the best form of such a questionnaire and, taking it as it stands, the reviewer ventures to suggest, in the light of the returns, that some definitions or expansion of headings would have cleared up ambiguities.

Some of the disease headings have been variously interpreted. Thus "tropical liver" is by some considered to be amoebiasis of that organ, by others as something else. "Septic sore" may mean ulcers apart from *ulcus tropicum*, which has its own heading, but that it does not usually convey this meaning is shown by the fact that in some tropical African returns "septic sore" does not figure at all, and chronic ulcers get their only mention in a footnote to *ulcus tropicum*.

"*Tinea imbricata*" should not have presented difficulty; it is a well-recognized disease chiefly found in islands of the Pacific; but in several African returns a large number of cases are recorded with the footnote that *Tinea* is meant [the printer has usually rendered it *Taenia*]; one must conclude that most of the ringworms appear under

this head. "Climatic bubo" too is a well-defined condition, more appropriately named, now that its nature is known, Poradenitis or Lymphogranuloma inguinale; many cases are returned as such with a note that "non-specific bubo" is meant. It is indeed necessary to study the footnotes in every return.

Would not a transposition of words have improved the heading of the second column, "Present or absent now or previously"? The wording perhaps accounts for the + sign in the yellow fever returns from Uganda, Tanganyika, Zanzibar and Straits Settlements. As the question is worded the reply must under any conditions be "Yes."

It is satisfactory to note that the British Empire portion of the survey occupies 193 pages, against 44 for French possessions and less for other countries; there are no returns from Algeria or Tunis. Dr. McKinley justly acknowledges the help afforded him by SCOTT'S Supplements to the *Tropical Diseases Bulletin*.

The survey is a mine of information to the professional man who will not be misled by returns in which presumably sporadic cases are recorded, e.g., St. Lucia, in which kala azar, trypanosomiasis and guinea-worm have the + sign and Gibraltar, in which returns most tropical diseases have a +, the number of cases for the year in question (1932) being in 27 instances recorded as 0.

If it is intended to pursue this enquiry and publish a further volume the recorders might be asked to state in what proportion of diseases caused by animal parasites the diagnosis was made by microscope; in some instances this is stated. In a revised questionnaire room might be found for Fevers of Unknown Origin and Infective Eye Diseases other than Trachoma.

Dr. McKinley and his collaborators have done a useful piece of work. The inquirer will find here under one cover tables of the diseases recorded in nearly all tropical and subtropical areas of the globe with some indication of their prevalence and their significance as public health problems. Dr. McKinley will have the thanks of all students of tropical disease.

A. G. Bagshawe.

PATERSON (A. R.) [Director of Medical Services, Kenya Colony] with the Assistance of Many Officers of the Agricultural, Education, Forestry and Medical Departments of Kenya. **The Book of Civilization. Part II. The Story of the Forest and the Land and the Men and the Cattle.**—pp. vii+52. With 3 plates (2 coloured). 1935. London: New York: Toronto. Longmans, Green & Co. [1s.]

As the reviewer of Part I stated (this *Bulletin*, 1935, Vol. 32, p. 306) this book has been written for Africans with a view to affording them help in realizing the problems at issue in proper housing, hygiene, farming, stock-raising, etc. Part II deals with "The story of the forest and the land and the men and the cattle." What do we want—the means to Happiness—Food supplies—Cultivation of Crops and cattle—The use of money as a means of exchange—The power to buy—A reason for producing.

Much that is said in regard to the wasteful methods adopted by natives in agriculture, etc., and the necessity for the adoption of newer ways, is all to the point. The loss to a country by the indiscriminate destruction of forest and similar problems are well demonstrated.

But many, whether they be medical men, educationists or anthropologists, will disagree with the writer of the book over some of the main issues and over many details, as was pointed out by the reviewer of Part I.

It is suggested, for instance, that wheaten bread, tea, coffee and sugar should be staple articles in the diet of the native and that water-filters should be used—a very dangerous doctrine. It is suggested that the great aim for the native should be the gain of sufficient money to pay for the schooling of his children—a very debatable point.

It is suggested that trade with Japan should be encouraged—one fails to see the reason.

The story is told in a phraseology which is doubtless an attempt to copy the method of story-telling among natives, reminiscent in some ways of the Old Testament. Such a method doubtless appeals to the author, but since it is written in English it is a question whether it would not have been better to introduce the native to straightforward English prose and thereby have saved many pages of text.

It is not obvious either why some half dozen footnotes are given to explain some simple words—"bare=uncovered," "trampled=walked heavily upon"—when at the same time the text is full of English idioms.

H. S. Stannus.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

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MALARIA.

MARTINI (E.). *Malaria im Menschen, Malariaarten und Stämme.* [**Human Malarial Infections.**]—Reprinted from *Zent. f. d. gesamte Hyg.* Vol. 31. No. 7/8. pp. 369–386. [4 pages of refs.]

A critical review of literature dealing with malaria which has appeared during the last ten years.

The author states that many more than 3,000 communications dealing with malaria have appeared during this period. In his review he is able to deal only with a selection of them.

It is interesting to note the important part played by malaria therapy in helping to solve many important problems in connexion with this disease. The important work of JAMES in this country is dealt with. The author discusses the question of there being a difference between the strain of malarial parasite used for malaria therapy and the parasite of the natural infections. He refers to various apparent differences in the clinical features, etc., of the two conditions. He concludes that there is no difference in the strains, and the various anomalies are due to peculiarities of the cases themselves and not of the inoculation strains.

Those interested in this subject should read the paper in original.

E. D. W. Greig.

ROSA (Alberto). *L'influenza dei fattori meteorici sull'andamento della malaria.* [**The Influence of Meteorological Factors on the Spread of Malaria.**]—*Riv. di Malariologia.* Sez. I. 1935. Vol. 14. No. 5. pp. 424–437. With 2 figs. [10 refs.] French summary.

The author's observations were carried out in the Ferrara Commune. He studied the rainfall, and temperature changes from 1900–1932, the malaria returns for the period 1922–34, and the rainfall, temperature and relative humidity from 1924 to 1934. He concludes that in undrained or improperly drained areas the rainfall is important in so far as it creates or maintains breeding sites, that is, the numbers of anopheles are the chief factor, and the temperature and relative humidity are secondary; where drainage (*bonifica idraulica*) is good the temperature and relative humidity are the determining factors as favouring the duration of life of the mosquito [the article savours rather of "Science from an easy chair"].

H. H. S.

STRICKLAND (C.). **Hill Malaria.**—*Indian Med. Gaz.* 1935. Oct. Vol. 70. No. 10. pp. 559–560.

Some recent expeditions in the Himalayas have been disorganized by malaria, and the author suggests how this may be avoided.

The spring is the hot season in the plains, and there is no malaria apart from relapses; at this season, travellers should keep as low as possible until they can make a dash over the dangerous 1,600 foot line, and then keep up as high as possible, because there is no infection in the high hills at any season. The danger of malaria increases as one ascends the foot hills from the plains until this 1,600 foot line is reached, then it becomes gradually less until it disappears in the heights. In the autumn the plains are very malarious and owing to the increasing cold there is a gradual decline in the infection rate of mosquitoes as one ascends. At this season travellers should keep as high as possible.

W. Fletcher.

SOREL. Etude sur le paludisme dans les milieux militaires du Tonkin. [**Malaria in the Principal Garrisons of Haut-Tonking.**]—*Ann. de Méd. et de Pharm. Colon.* 1935. July–Aug.–Sept. Vol. 33. No. 3. pp. 501–525. With 11 graphs (1 plan).

This report is largely of local interest, but it shows the importance attached to prophylactic quinine in the French Army.

Malaria in Tonking, and especially in Haut-Tonking, was very severe and deadly up to the year 1910; but since that time it has undergone a gradual change and has become milder in type and more amenable to treatment. The author attributes this change partly to the effects of prolonged quinine administration and partly to a better standard of living, better food and greater comfort, which maintains the health of the soldiers and makes them more resistant to disease. Prophylactic quinine is given to all troops in malarious stations in accordance with strict orders from headquarters. In 1933, the G.O.C. issued an order to the effect that commanding officers were themselves to see that their men took quinine at the daily parade, and that if there was any doubt about the tablets being taken quinine in solution was to be issued and the dose swallowed in front of an N.C.O. The daily dose of quinine is 4 grains a day. Tables are given showing the improvement following this prophylactic treatment during a period of three years in some garrisons where no other measures of prevention were in force.

W. F.

i. LAI (Daniel G.), LI (Yu-Jen) & CHANG (Wei). **A Malaria Survey in Kao-Chiao, Shanghai.**—*Chinese Med. Jl.* 1935. May. Vol. 49. No. 5. pp. 462–468. With 1 map & 2 figs.

ii. HU (Stephen M. K.). **Notes on the Relative Adult Density of *Anopheles hyrcanus* var. *sinensis* Wiedemann during 1933 with Reference to Malaria Incidence in Kaochiao, Shanghai Area.**—*Ibid.* pp. 469–474. With 1 chart.

i. Kao-Chiao is a part of Greater Shanghai. It is surrounded, except on one side, by the Wangpoo and Yangtze Rivers and is intersected by numerous creeks. The spleen index of 752 children was 18.4 per cent. and parasites were found in 5.2 per cent. of 1,803 apparently healthy school children. Benign tertian, 59.9 per cent., was the most common type of infection: quartan came next with 33.8, and

subtertian, 6.4 per cent., was the rarest form. The peak of the malaria curve was reached in August.

ii. The only species of anopheles is *A. hyrcanus* var. *sinensis*. Data concerning the relative adult density were obtained throughout the year by means of a man-baited trap. The first massive emergence began in the latter part of May. The maximum number of anopheles was taken during the first half of July. None were caught after the middle of October. The adult density was found to be correlated with the incidence of malaria cases. W. F.

HU (Stephen M. K.). **The House-frequenting Behavior of *Anopheles hyrcanus* var. *sinensis* Wiedemann in the Shanghai Area. Part I—Time of Entry.**—Reprinted from *Lingnan Sci. Jl.* 1935. July. Vol. 14. No. 3. pp. 385–394. With 4 charts & 3 figs. on 2 plates.

These mosquitoes enter houses during the night only.

Anopheles hyrcanus var. *sinensis* did not enter a man baited trap until after sunset. Once they had commenced entering they were generally found to fly in continuously during the night. Observations were made at the same time in the bedrooms of houses in the neighbourhood, and it was found that the data obtained from the trap were a good indication of what actually occurred in the village. Illustrations are given of the hut used as a trap. The collector opened all four windows of the little house and lay down under a mosquito-net in the centre. Every hour, awakened by an alarm clock, he got up, closed the windows and collected all the mosquitoes in test tubes with the help of a flash lamp. There was no light in the hut while the windows were open. The experiment lasted throughout the mosquito season, from June 22 to October 19. After the first week in October, no mosquitoes entered the trap. W. F.

SINTON (J. A.) & WATS (R. C.). **The Efficacy of Various Insecticidal Sprays in the Destruction of Adult Mosquitoes.**—*Records of the Malaria Survey of India.* 1935. Sept. Vol. 5. No. 3. pp. 275–306. With 2 charts & 1 fig. [23 refs.]

Insecticides which contain extracts of pyrethrum flowers are more efficient than those which do not. A mixture of one part of such an extract (Pyroicide 20) with 19 parts of kerosene oil was found by the authors to be a highly efficient spray for household use in India. Pyroicide 20 is a concentrated extract of pyrethrum flowers prepared by the McLaughlin Gormley King Co., Minneapolis, Minnesota. The spray was not toxic for man and did not damage clothing. Its cost was only half that of the best sprays on the Indian market, but its action was equally good. It should be stored in tins in a cool, dark place. Full details of the authors' experiments and tables showing the results are given. W. F.

ROY (Profulla Kamal). **Investigations on the Prevention of Malaria in Rural Areas.**—*Jl. Indian Med. Assoc.* 1935. Aug. Vol. 4. No. 12. pp. 531–540.

Members of Health Societies take prophylactic quinine.

The author describes the work done "at Sri-Nibetan, the Visva-Bharati Institute of Rural Reconstruction of Dr. Tagore at Surul,

Birbhum." During the dry season effort is concentrated on abolition of mosquito breeding places and all the work is done by the villagers themselves acting on co-operative principles. They form themselves into Health Societies under the guidance of the Institute. After the onset of the rains, temporary collections of water are dealt with by oiling, persons suffering from malaria are treated with quinine or, preferably, with cinchona (? cinchona febrifuge) and the healthy are given 5 grains twice a week as a prophylactic. W. F.

ARNAUD (J.). La prophylaxie du paludisme à In Salah (Tidikelt). Essai d'introduction des gambouses dans une oasis saharienne. [**Malaria Prevention in the Oasis of In Salah.**]—*Arch. Inst. Pasteur d'Algérie*. 1935. Sept. Vol. 13. No. 3. pp. 369-376. With 1 plan & 4 figs. on 2 plates.

This oasis measures about 4 miles long by 600 yards broad; its population, together with that of a neighbouring smaller oasis, numbers 20 Europeans and 1,000 natives. The splenic index is only 3.1; such malaria as occurs is mild in type; the only anopheline found is *A. multicolor*. Rain is rare, and when it comes it sinks quickly into the sand. The palm plantations are irrigated with water from artesian wells and underground channels. All surplus water dries up during the hot weather which lasts from May to October, but during the rest of the year pools of stagnant water in the plantation are very numerous. The author obtained a supply of *Gambusia* from the oasis of El Golea, 420 kilometres to the north, and acclimatized them gradually to the saline waters of In Salah where they are proving a success. W. F.

FLETCHER (Alfred H.). **A Permanent Type of Ditch Construction.**—*Amer. Jl. Public Health*. 1935. Aug. Vol. 25. No. 8. pp. 897-906. With 6 figs. & 1 chart.

Approximately \$140,000 (£28,000) have been spent on malaria control in Memphis, Tennessee, during the last 14 years. The chief charge has been the oiling of the ditches. Recently 6 miles of permanent drains, lined with concrete and sods or with "rip-rap" material and sods, have been constructed with the help of relief labour. Rip-rap is broken pieces of concrete or stone with one smooth surface, such as may be obtained from old walls, paving, etc. This report gives technical details of the way in which the drains are being made, and it is illustrated with excellent "before and after" photographs.

W. F.

BIZARD (M.). Paludisme autochtone dans le région nazairienne. [**Indigenous Malaria in the St. Nazaire District (Loire inférieure).**]—*Ann. d'Hyg. Pub., Indust. et Sociale*. 1935. Sept. Vol. 13. No. 9. pp. 505-512.

Malaria was common here 45 years ago; it has now disappeared though *A. maculipennis* is plentiful.

Malaria was common in this district 45 years ago, and some of the chemists sold as much as 6 or 7 kilograms of quinine in a year. After 1895, it became less and less common until it disappeared altogether: for the last 12 years there has been no malaria in la Brière. The

district consists of an immense plain, some 8,000 hectares in extent, which is a vast lake in the winter and a grassy prairie in the summer. The villages stand like islands in this plain : each surrounded by a dyke and a circle of trees. Inside the dyke is a circle of houses and in the middle are arable fields. During the winter, they are surrounded by floods and communication with other villages is made by boat. The houses are thatched, single-roomed hovels with earthen floors. Until the end of last century the inhabitants supported themselves by turf-cutting in the summer and by fishing and catching wild duck in the winter. They were miserably poor. During the last 50 years, and especially since the war, communications have been improved, and the inhabitants have been able to work in shipyards, factories and towns, and their standard of living has been improved. This has raised their resistance to disease. Their houses have been improved and are less attractive resting places for mosquitoes. They now keep cattle, instead of sheep, and these are brought in at night and kept in sheds adjoining the houses. These changes, acting together, are probably responsible for the disappearance of malaria, for *A. maculipennis* is still present in large numbers.

Cases of malaria still occur occasionally in the towns situated on the borders of la Brière (Trignac Penhoet and St. Nazaire). Fifty cases have been diagnosed in these localities during the last 13 years. Most of them have been benign tertian infections, and they have occurred in the neighbourhood of old repatriated cases of malaria. It is possible that some cases, particularly in St. Nazaire, have been infected from cases brought on ships coming into the port. W. F.

POGGI (Igino). Lo stato attuale dell'endemia malarica nel comune di Vigevano. [**The Present Incidence of Malaria in Vigevano (Pavia).**]—*Arch. Ital. Sci. Med. Colon.* 1935. Sept. 1. Vol. 16. No. 9. pp. 683-694. With 1 fig. [21 refs.] English summary (5 lines).

In the Commune of Vigevano there is not much malaria ; 33 cases were reported in 1934 and in the past 15 years there has been a total of 391 only. A plan of the district is given and 29 of the total 33 occurred in one area, Morsella, while of the 391 in the 15 years 266 or 68 per cent. were in this section, and next came Sforzesca with 65 or 16.6 per cent., but in the last 8 years there has been no case in the Sforzesca section. In short, Morsella is now the only endemic focus. The prevailing mosquito is *A. maculipennis messeae* and in small numbers the *melanoon* variety. These occur over the whole territory so there is elsewhere considerable anophelism without malaria, and it is probable that adequate treatment of the infected would eradicate malaria from Morsella also, as this measure has proved so effectual in other parts of the commune. H. H. S.

FADDA (Siro). La malaria nelle Colonie italiane dell'Africa orientale. [**Malaria in the Italian Colonies in East Africa.**]—*Rassegna Economica d. Colonie.* 1935. Nov.-Dec. 23rd Year. No. 11-12. pp. 713-720. With 2 maps.

Maps are reproduced demonstrating by varied shading the zones of prevalence of malaria in Eritrea and Italian Somaliland and in the letterpress a few words are given regarding the local incidence. *Anopheles costalis* is the common vector, but *A. quadrimaculatus*, *A. funestus* (rare), *A. mauritanus* and *A. pharoensis* also are found, but

there is no evidence that either of the two last act as local vectors of malaria. All three forms of malaria are met with but *P. falciparum* vastly preponderates; of 1,825 blood smears examined 5 per cent. were benign tertian, 0.5 per cent. quartan, all the rest were subtertian. Pernicious forms are rare.

H. H. S.

MONTAÑES (P.) & CARDERERA (M.). Una epidemia de paludismo a partir del virus palúdico. [An Outbreak of Malaria spread from Inoculated Patients.]—*Rev. San. e Hig. Pública*. 1935. Sept. Vol. 10. No. 9. pp. 213-216. With 1 fig.

In the summer of 1934 cases of malaria began to appear in Huesca, a place some distance [in the sketch included in this article there is no scale of distance] from the asylum in which malaria inoculations were being made for treatment of general paralytics. The first person attacked was a woman who had come to the asylum direct from Ansó in the Pyrenees, where malaria is unknown. She suffered from attacks of fever and *P. vivax* was found in her blood, although she was not one of the inoculated patients. This was in September 1933. During 1934 up to 14th July 45 cases had occurred and later there were others, 52 are represented on the sketch—15 in the town of Huesca, 28 in the asylum, 4 in Tierz, 2 in Quicena and 3 in isolated houses. There were two ponds near the asylum and another near Quicena in which *Anopheles* larvae were found.

H. H. S.

BARBER (M. A.) & RICE (J. B.). Malaria Studies in Greece. The Malaria Infection Rate in Nature and in the Laboratory of Certain Species of *Anopheles* of East Macedonia.—*Ann. Trop. Med. & Parasit.* 1935. Oct. 5. Vol. 29. No. 3. pp. 329-348.

A. elutus is the most important vector in northern Greece, *A. superpictus* probably plays a secondary part, though it is more readily infected in the laboratory. Deviation by domestic animals.

Mosquitoes were collected in the country which lies between the lower part of the Nestos River and the valley of the Struma; this is probably representative of all northern Greece as far as the natural infection rate of *Anopheles* is concerned. The average rates of infection over 10 months were: *elutus* 2.37; *superpictus* 1.82; *maculipennis* 0.27. No variety of *maculipennis* was found except *messeae* and *typicus*. Both *elutus* and *superpictus* reach their maximum of infection in midsummer. The first sporozoite-positive specimens were found on the following dates: *elutus* May 21st, 1934; *maculipennis*, June 2nd, 1933; *superpictus*, June 29th, 1933. Precipitin tests made on mosquitoes caught in houses and in stables showed that *elutus* had a far higher percentage positive for human blood than any other species. The figures were: *elutus*, in houses 61.3, in stables 7.5; *maculipennis*, in houses 21.2, in stables 0.5; *superpictus*, in houses 29.7, in stables 1.6. The feeding habits of infected *elutus* were found to be the same as those of non-infected specimens, for the proportion of them which contained human blood was the same as the general rate for this species. Catches made during the day showed that *elutus* had the highest degree of preference for houses and *superpictus* for stables. "*Elutus* is the only species in which house-frequenting, sporozoite index, and percentage human-positive of blood meals run at all parallel."

The percentages of these *anopheles* which became infected when they were fed in the laboratory were very different from those found in

nature. They were as follows: *elutus* 20.3; *maculipennis* 20.2; *superpictus*, 55.2. *A. Algeriensis* was also readily infected in the laboratory, but it is not a natural carrier in Macedonia. *Maculipennis* is probably of little or no importance in the actual transmission of malaria; there are large numbers of domestic animals in the villages, and deviation to animals is the probable explanation of the low sporozoite rate found in wild mosquitoes of this readily infected species. "The rôle played by *superpictus* in this part of Macedonia is difficult to determine." During recent years the numbers of *elutus* in some villages have been greatly reduced by drought, while *superpictus*, which breeds in spring-fed streams, has not been affected. The authors found that the parasite rate in the children of these villages had fallen, though *A. superpictus* was flourishing, and they also found that the sporozoite rate of *superpictus* itself was reduced as well. They consider that this species becomes of importance when a high percentage of the inhabitants has already been infected by the agency of *elutus*.

"It is quite possible that a species which, like *superpictus*, has a relatively low human precipitin rate may show many infections by virtue of the large number of gametocyte carriers provided by a more effective associated species, and without this powerful ally it might show but a small oocyst or sporozoite rate. . . . During a very long warm season here, or in a warmer region, *superpictus* might become more dangerous; and, in a region less abundantly supplied with domestic animals, both *maculipennis* and *superpictus* might be important vectors. We believe, however, that our work has established a presumption sufficiently strong to warrant the attack on *elutus* only in this region."

W. F.

SADOJAN (W. S.) & ISTAMANJAN (L. S.). Atypische Malaria-Formen im Gebiet von Dawalu im Jahre 1931. [Atypical Malaria in Davalu, Armenia.]—*Arb. d. Tropeninstituts d. Volksgesundh. Kommissariat d. SSR. Armenien*. 1935. Vol. 2.. [In Russian p. 342. German summary p. 370.]

The authors relate that in the latter part of 1931, September to November, certain cases of malaria occurred which presented anomalous symptoms by reason of which the diagnosis was for a time in doubt. Thirty-two such cases came under their observation; 12 of them presented neuro-psychic symptoms resembling those of tetany, meningitis and other nervous affections; 10 showed symptoms of renal involvement, 6 had signs of hepatic disease and 4 entero-colitis and dysenteric symptoms. In all malaria parasites were found in blood smears and the symptoms cleared up after treatment with quinine. Some were associated with the benign tertian parasite. The authors are of opinion that these atypical symptoms were due in part at least to an increased virulence of the plasmodium when infecting persons coming from a malaria-free district to work in Davalu.

H. H. S.

DE MELLO (I. Froilano) & BRÁS DE SÁ (L. J.). Ne pourra-t-on faire revivre la "Vieille Gôa"? (Une page intéressante de malariologie: le paludisme des ruines et des villes mortes.) [Malaria of Ruined Towns. Can "Ancient Goa" be Restored?—*Riv. di Malariologia*. Sez. I. 1935. Vol. 14. No. 3. pp. 273-291. With 2 plates.

Nothing remains of Old Goa but a mass of ruins overgrown with luxuriant vegetation. Its total population numbers only 75 persons,

and only half of these are in permanent residence. It is full of abandoned wells and pools; the authors counted 296, many of which were hidden by undergrowth and ruins. It is notorious for a malignant type of malaria. The importance of Old Goa is largely sentimental; the body of St. Francis Xavier is buried there; it is therefore venerated by Catholics all over the world and is a place of pilgrimage not only for Christians, but for people of all castes and creeds. The wells and pits are the principal breeding places of *A. listoni* and *A. varuna*, the carriers. This survey was made at the cost of the canons of the cathedral who subscribed privately for the purpose. The author pleads that an attempt should be made to rescue the old town, "the Rome of the east," which once had a population of 300,000, and which is the only place of Christian pilgrimage in the East. W. F.

RAM (Raja). **Roads and Malaria in India.**—Reprinted from *Indian Engineering*. 1935. Apr. 6 pp. With 7 figs. & 1 plan.

A useful article illustrated with photographs and plans drawing attention to malaria caused by engineering work, and suggesting remedies. W. F.

COVELL (G.) & BAILY (J. D.). **Malaria in Sind.** Part XIII. Malaria in Hala Taluka, Hyderabad District, and in Kandiaro, Sinjhor and Shahdadpur Talukas, Nawabshah District. Part XIV. The Seasonal Incidence of Infection with the Different Species of Malaria Parasite in Larkana.—*Records of the Malaria Survey of India*. 1935. June. Vol. 5. No. 2. pp. 109–119; 121–129. With 1 chart.

WILSON (T.). **Meteorological Factors as affecting the Incidence of Malaria.**—*Malayan Med. Jl.* 1935. June. Vol. 10. No. 2. pp. 39–48. With 5 charts & 1 map. [15 refs.]

The number of *A. maculatus* caught in houses does not necessarily correspond with the total number. A larger proportion enters houses when the wet-bulb temperature is high.

The author reviews the incidence of malaria over a period of five years in the Tampin and Kuala Pilah districts of Negri Sembilan which is one of the Federated Malay States. There are two rainy seasons, a lesser one in March, April, May and a greater in October, November and December. The larval incidence of *A. maculatus*, the principal carrier, is at its height shortly after the greater wet season; the adult incidence is highest during the lesser wet season, in March, April, May; Malaria incidence is highest in May, June, July. The author points out that the adult incidence is obtained by catching mosquitoes in houses at night, and that it represents the number seeking human blood, and not necessarily the adult output of the breeding places. *A. maculatus* appears to be more active in seeking blood during the period of higher wet bulb temperature. W. F.

JACKSON (R. B.). **Annual Report of the Work of the Malaria Bureau for the Year 1934.**—*Hong Kong Med. & San. Rep. for Year 1934*. Appendix B. pp. 116–158. With 1 folding plate.

This record of the very large amount of work which has been done during the year deals with the results of investigations made in different

villages and camps and is chiefly of local interest. Malaria in Hong Kong is rural malaria. The following mosquitoes were found infected: *A. minimus*, *A. jeyporiensis*, *A. hyrcanus*, *A. maculatus* and *A. splendens*. The first two are the most important carriers. The most dangerous breeding grounds are abandoned rice fields in hilly country and, in the last quarter of the year, cultivated fields during the draining off of the water just before the second harvest. A number of precipitin tests were made by M. Toumanoff of the Pasteur Institute, Saigon, on the stomachs of Anopheles caught at a labourers' camp at Shing Mun, in Hong Kong, where a dam is being built, and a large proportion of them were found to contain human blood. The percentage of admissions for malaria as compared with the admissions for all diseases to the hospitals was only 3.27 per cent. (1,392 of 42,056). (See this *Bulletin*, 1935, Vol. 32, p. 731.) W. F.

GERLACH (J. H. A.). Nadere beschouwingen over de malaria in de Onderafdeling Dairilanden (Residentie Tapanoei). [**Further Consideration of Malaria in the Subdistrict Dairilands (Tapanoei Residency).**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1935. Sept. 17. Vol. 75. No. 19. pp. 1639-1645.

SCHÜFFNER has given, as the causes of a low spleen rate in conjunction with a high parasite index the following:—(1) A commencing acute epidemic. (2) Such a severe endemic of pernicious malaria that the spleen does not react on account of the prevalent cachexia. (3) Quinization especially in malaria tropica. (4) The non-inclusion of the lowest degrees of splenic enlargement, which is all important where endemicity is slight. (5) A definite form of inherited immunity (pemmunity), such as is found for example among the Bantus in Africa.

In the Netherlands Indies a high spleen rate in all age groups is regarded as typical of severe endemic malaria together with a much lower parasite index particularly in adults. HELFFERICH published [this *Bulletin*, 1935, Vol. 32, p. 96], as a notable exception to the findings of SCHÜFFNER and SWELLENGREBEL, his observations in the Dairilands district, where practically throughout there was found a low spleen rate with a high, often much higher parasitic index. Gerlach has continued these investigations in the same district and has obtained the same result for numbers which are considerable and which, although separately given for 3 kampongs, may be combined as follows:—(1) 416 children under 6 years, spleen rate 1.2 per cent., parasite rate 7.7 per cent. (2) 1,370 children over 6 years, spleen rate 4.5, parasite rate 5.8. (3) 527 adults, spleen rate 0.9, parasite rate 4.6 per cent. He summarizes his findings, taken in conjunction with those of his predecessor, thus:—As is commonly the case in the Netherlands Indies, the chronically endemic malaria of the Dairilands, which gives rise to a high spleen rate at all ages and to a relatively low parasitic rate diminishing gradually with advancing age, is only found when frequent infection persists. On the contrary, when the infection rate is small a low spleen rate occurs, which is at its highest in older children and then gradually diminishes, while the parasite index is relatively high and often much higher. The latter, however, just as in the case of severe endemic malaria, probably diminishes with increasing age.

The author's view is that the essential cause for this state of affairs is a differentiation in the biological type of the malaria parasite and not a development of a degree of body resistance. W. F. Harvey.

GARNHAM (P. C. C.). **Hyperendemic Malaria in a Native Reserve of Kenya and the Influence upon its Course of Atebrin and Plasmoquine.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. July 31. Vol. 29. No. 2. pp. 167–186. With 4 charts. [10 refs.]

Malaria in the African native living in a hyperendemic village area causes little sickness even in children, and preventive drug treatment serves no useful purpose in such a population.

This investigation was carried out in Taveta, which lies near the Tanganyika border of Kenya Colony, where the first shot in East Africa was fired during the War. The natives live in a strip of forest where malaria is hyperendemic. There were about 25 adults and 20 children in each village. One gram of atebrin (less for children) was given monthly, in 10 separate doses, to each inhabitant of one village. In a second village, 0.1 gram of plasmoquine was given in 10 doses. A third village was observed as a control. The treatment was continued for a year. The only apparent effect was a lowering of the average number of parasites found in blood films of the inhabitants of the treated villages—the parasite and spleen rates were unchanged. This did not appear to be a result of much value, because malaria causes very little illness among the natives in spite of the heavy blood infections. The average number of clinical attacks of fever during the year was one for each inhabitant. The author considers that malaria in the native of tropical Africa resembles the malaria of birds, reptiles and monkeys; immunity has become so complete that morbidity is reduced to a minimum. Eighty-five per cent. of the infants were infected by the 5th month and 100 per cent. by the 6th, but, in spite of this, they looked well-nourished and healthy. Subtertian and quartan infections are ubiquitous, but benign tertian is rare and has a focal distribution, occurring only in certain places. It is very remarkable that, in Taveta, *P. vivax* seems to be the most dangerous parasite. *P. vivax* and *P. falciparum* appear at the end of the second month of life; *P. malariae* does not appear until the fifth month, but by the end of the first year nearly every child is infected with this parasite. Immunity against *P. malariae* is soon established, and only 1.5 per cent. of quartan infections were found in 1,000 adults. Approximately half the infants over two months had crescents in their blood. About 80 per cent. of the children showed parasitic infection, 30 per cent. of the young adults and 25 per cent. of the older ones.

W. F.

HOYT (R. N.) & WORDEN (R. D.). **Malaria Epidemic in Aurora, Ohio.**—*Public Health Rep.* 1935. July 5. Vol. 50. No. 27. pp. 895–897.

Interesting because of the quarantine imposed on the patients.

Aurora is a village about 30 miles from Cleveland, with a population of 1,000 and "two attractive inns patronized by tourists." It had had no malaria since records were first kept in 1920, until the late summer of 1934 when there was an epidemic of benign tertian with 37 cases. The breeding places were oiled and, "on advice of the State Department of Health, patients were required to stay within screened enclosures until 4 negative blood smears, taken at least 24 hours apart, were obtained. This regulation was supplemented by an agreement signed by the patient or parent to complete 8 weeks of quinine or 5 days of atabrine therapy and to submit to a final blood examination after treatment had been completed."

W. F.

COLLIGNON (E.). Observations générales sur la campagne antipaludique de 1934 dans le département d'Alger. [**The Antimalaria Campaign of 1934 in the Department of Algiers.**]—*Arch. Inst. Pasteur d'Algérie*. 1935. Sept. Vol. 13. No. 3. pp. 377-396. With 10 figs. on 5 plates.

The year 1934 was marked by an increase of malaria which was attributed: (1) to a lack of immunity in the population resulting from a succession of healthy years; (2) to the migration of numbers of people into newly developed areas; (3) to an unusual distribution of the rainfall; and (4) to poverty due to trade depression. This increase of malaria has not affected the whole of the country; in those places where antimalaria work has been carried out, there has been no increase except in a town near a lake which is now being drained through a tunnel into the sea. The carrier is *A. maculipennis*, var. *labranchiae*, which is found in the houses as well as in the stables. The measures adopted for the control of malaria are: (1) Permanent engineering works, such as the tunnel already mentioned; (2) Temporary work such as fortnightly oiling and minor filling and drainage; (2) The introduction of *Gambusia*; (4) Quinization which is carried out in all centres from the beginning of May until the end of November, and especially concerns children. The natives take quinine with enthusiasm and the chocolates containing aristoquine are liked by the children. W. F.

AMBIALET (R.). La campagne antipaludique de 1934 dans le département de Constantine. [**Malaria in the Department of Constantine during 1934.**]—*Arch. Inst. Pasteur d'Algérie*. 1935. Sept. Vol. 13. No. 3. pp. 397-409. With 10 figs. on 5 plates & 3 plans.

The incidence of malaria was definitely above the average, though it was not as severe as it has been in some of the very bad years of the past. The year was exceptionally wet, and many marshes that are normally dry in the summer provided breeding places for mosquitoes. Some places in the plains which are free from malaria in dry years experienced severe epidemics, but the mountain villages, where streams are the only breeding places, were not troubled by outbreaks. Anopheles are most active from the middle of June to the middle of July, and again in September and November. There is little or no transmission in mid-summer because the intense heat and the sirocco destroy the mosquitoes. Details of malaria and of the measures taken to deal with it in different centres are given, together with some excellent photographs showing reed-fringed lakes, marshes, and water-courses with strings of shallow pools. Good results have been obtained by anti-larval measures combined with quinine prophylaxis and treatment, special attention being given to the children. W. F.

GOUGET (R.). La campagne antipaludique de 1934 dans le département d'Oran.—*Arch. Inst. Pasteur d'Algérie*. 1935. Sept. Vol. 13. No. 3. pp. 410-417. With 12 figs. on 6 plates.

LA CAVA (G.). *Plasmodium immaculatum* (Grassi e Feletti, 1892) Schaudinn (1902), è l'esatta denominazione per il parassita agente della malaria terzana maligna. [**The Correct Name of the Parasite of Malignant Tertian Malaria.**]—*Policlinico*. Sez. Prat. 1935. Nov. 4. Vol. 42. No. 44. p. 2187.

According to the author of this note the usual denomination, *P. falciparum*, for the parasite of malignant tertian malaria is a synonym,

the correct name being *P. immaculatum* Grassi and Feletti 1892 and Schaudinn 1902. Other synonyms, he states, are *Haemamoeba immaculata*, *H. praecox*, *Laverania malariae* and *Haematozoon falci-parum*. [This question has been discussed more than once before (see Protozoology, by C. M. WENYON, Vol. 2, p. 934. "If it be considered that Grassi and Feletti's name, *P. immaculatum* was employed for a parasite which cannot definitely be identified with that of malignant tertian malaria" the "correct name for the parasite will be *P. falci-parum* (WELCH, 1897)").]

H. H. S.

BOURGIN (P.). Un cas de paludisme congénital. [A Case of Congenital Malaria.]—*Bull. Soc. Méd.-Chirurg. Indochine*. 1935. Feb.-Mar. Vol. 13. No. 2. pp. 137-138.

Parturition occurred on 14th February. Benign tertian gametocytes were found in the mother's peripheral blood and in the umbilical cord of the child. Neither mother nor child had fever. The mother was treated with quinacrine. On 20th February no parasites were found in either, but both of them had a high percentage of mononuclears.

W. F.

TANNER (N. Cecil) & HEWLETT (R. F. L.). Congenital Malaria with Report of a Case in One of Twins.—*Lancet*. 1935. Aug. 17. pp. 369-370. [15 refs.]

A case of congenital malaria without fever in a child born in England whose mother was infected in India.

The mother returned to England from Bengal in September 1934, and gave birth to twins in St. Pancras Hospital on January 14, 1935. She had one or two attacks of malaria every month during pregnancy, the last of them being 10 days before her confinement. One of the twins was admitted to Highgate Hospital with a history of 4 days illness, when it was 50 days old. Its blood was examined on March 8, 53 days after birth, and benign tertian parasites were found. The spleen was enlarged to 4 cm. below the costal margin. The child was given no specific treatment during the first 10 days, and, though at the end of this time it still had parasites in its blood, it had neither fever nor rigors during the whole period of observation. It was then given two five-day courses of atebryn with six days interval between them. The daily dose was 0.05 gram in divided doses. No parasites were found afterwards. There was some vomiting and slight diarrhoea during each course, but no other toxic symptoms or skin staining. No parasites were found in the other twin during repeated examinations; its spleen was not enlarged. Benign tertian parasites were found in the mother's blood.

W. F.

SHIROKOGOROV (J.). Symmetrical Gangrene of the Lower Extremities in Malaria, and its Pathogenesis.—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 3. [In Russian pp. 220-227.]

During 1932-1933 the author observed gangrene of the toes in a number of cases of M.T. malaria from the endemic regions of Azerbaijan (Caucasus). The majority of them recovered, but fifteen died and provided material for the histopathological investigation. All the cases showed signs of marked emaciation. In the majority the lesions represented dry gangrene affecting the nail phalanges of the toes.

of one or both feet, while in some cases mutilation was present. Sometimes the process assumed the character of moist gangrene, extending to the foot and leg. Microscopical examination revealed thrombosis of the venules of the affected parts and changes in the walls of the arteries. The pathogenesis of this form of gangrene is viewed by the author as follows:—The toxins bring about sclerotic changes in the walls of the small arteries and veins and cause the swelling and desquamation of the capillary endothelium. Alteration in the physico-chemical properties of the blood, due partly to the erythrocytes being loaded with parasites; agglutination of the red cells; the frequent formation of thrombi in the capillaries, are factors causing a retardation in the circulation of the blood; and finally, exposure to cold—by increasing the viscosity of the blood—leads to stasis in the affected parts, with the consequences already described. C. A. Hoare.

DIMITRIU (C. C.) & POPOVICI (A.). Paludisme associé à l'urticaire et au syndrome douloureux abdominal aigu. [**Malaria associated with Urticaria and Acute Abdominal Symptoms.**]*—Bull. et Mém. Soc. Méd. Hôpit. de Bucarest.* 1935. June. Vol. 17. No. 6. pp. 99–101.

The authors were called urgently to a patient with acute abdominal symptoms and urticaria. A history of malaria contracted 9 months before, and of two subsequent relapses, put them on the right track. They examined the patient's blood, instead of sending him to the operating theatre, and they found benign tertian parasites. They attribute the abdominal pains to transient thromboses produced by parasite-laden corpuscles, malaria pigment, etc., and to the blocking of the biliary passages with thickened bile. The urticaria they consider as evidence in favour of the theory of ABRAMI and SENEVET that the paroxysm in malaria is a manifestation of anaphylaxis. IV. F.

MARSEILLE (A.). Een geval van malaria quartana met verschijnscelen van appendicitis. [**Quartan Malaria simulating Appendicitis.**]*—Geneesk. Tijdschr. v. Nederl.-Indië.* 1935. Aug. 20. Vol. 75. No. 17. pp. 1505–1506.

The patient, an adult, complained of pain about the umbilical region and of constipation; there was no vomiting. Forty-eight hours later after the bowels had acted, pain was felt in the right side of the abdomen and particularly so on palpation over McBurney's point. There was no enlargement of liver or spleen; pulse 70 good, temperature 37·6°C. in the evening. Blood smear showed schizonts of *P. malariae* and the large monocuclear count was 8 per cent. of a total of 5,200 leucocytes. Quinine was given, and the symptoms cleared up.

The author has found 10 similar cases recorded; 5 were diagnosed only after operation had been undertaken. Of these ten, 8 were infected with *P. vivax*, 2 with *P. falciparum*. Attention is called to the slight leucopenia and relative monocytosis in these cases.

H. H. S.

CHATTERJEE (Nirmal Chandra). A Case of Capillary Bronchitis and Cerebral Malaria.—*Calcutta Med. Jl.* 1935. Oct. Vol. 30. No. 4. pp. 231–233.

YOUNG (A. Greville). Cerebral Malaria or Encephalitis Lethargica? [Correspondence.]—*Brit. Med. Jl.* 1935. Sept. 14. p. 523.

JORGE (A. Lourenço), DA SILVA (José Ferreira) & LEAL (A. Estillac). Esplenomegalias congestivas hemorrhagiparas. [**Congestive Splenomegaly with Haemorrhage.**]—*Bol. da Secretaria Geral de Saúde e Assistência*. Rio de Janeiro. 1935. Oct. 15. Vol. 1. No. 2. pp. 13–30. With 3 plates. [24 refs.]

The authors describe three cases of splenomegaly, the spleen extending to below the level of the umbilicus. Two had had acute dysentery and syphilis and all gave a history of malaria. In one a diagnosis of Banti's disease was made. Administration of adrenalin brought about considerable reduction, but some time later, a week in one case, there were attacks of haematemesis and the splenic enlargement was still further reduced, nearly to normal. The condition is explained as being a splenic thrombophlebitis and the haemorrhage as due to rupture of the gastro-splenic anastomoses. The precise parts played by the malaria, the dysentery and the syphilitic infection are not determined.
H. H. S.

MOSNA (Ezio) & SALUSTRI (Enrico). Grado di resistenza alla chinina di differenti ceppi di *Plasmodium vivax*. [**Resistance of Different Strains of *P. vivax* to Quinine.**]—*Riv. di Malariologia*. Sez. I. 1935. Vol. 14. No. 3. pp. 263–272. With 12 charts. [12 refs.] English summary (7 lines).

The authors tested three strains of *P. vivax*, one from Northern, one from Central and one from Southern Italy, each on 4 general paralytics. The points particularly investigated were the period of incubation, the type of fever, the capability of infections in Anopheles, and the resistance of the disease set up to quinine.

As regards the incubation, in two cases the northern strain had the long periods of 22 and 19 days, the other two with this strain were 9 and 10 days and, speaking generally, there was (with the two exceptions) little or no difference, the periods being 10–13 days. In each case 12 Anopheles were used to infect. Regarding the second point, no differences were noted, either among the two infected by Anopheles or others infected by blood inoculation—11 with the northern strain, 20 with the central and 10 with the southern. A protocol shows the numbers of mosquitoes (varying from 670 to 110) applied to those infected with the different strains, the numbers examined and the numbers and percentages found infected. No great differences were detected between the strains; with the northern the percentages were 71·5 and 93; with the central 70 to 88·7; with the southern 98·5. Lastly, 0·3 gm. of quinine in one dose sufficed to check the attacks of fever due to the first two strains and to cause temporary disappearance of parasites from the blood, but this dose had no effect on the fever produced by the southern strain.
H. H. S.

TRENSZ (F.). De l'influence des ions salins sur la floculation et la surfloculation du sérum des paludéens. [**Henry's Reaction. The Influence of Saline upon Flocculation and Surfloculation.**]—*C. R. Soc. Biol.* 1935. Vol. 119. No. 24. pp. 966–968.

CHORINE and others consider that flocculation and surfloculation are identical, but the author believes that he has shewn that they differ fundamentally. He now brings forward additional evidence in support of his views. He has carried out the reaction in solutions of neutral

salts of Na, K, Mg, Ca and NH_4 . As the strength of some of these solutions was increased, both flocculation and surflocculation diminished; it was not merely a question of molecular concentration, but differed with the different salts. Moreover, the curves of flocculation and surflocculation did not run parallel with the increase of salt concentration. For example, with ammonia, they deviated progressively at first and then approached one another. The maximum deviation occurred at a concentration of 3 per 1,000. Some salts accentuated flocculation while they diminished surflocculation. For example with $\text{PO}_4 (\text{NH}_4) \text{H}_2$, in concentrations of 10 to 15 per 1,000, flocculation was strongly increased while surflocculation was suppressed. The results of these experiments tended to show the essential difference between the two phenomena. This could also be demonstrated by gradually increasing the quantity of distilled water used in the test while keeping the amounts of the other components fixed. With progressive dilution, melanoflocculation decreased while surflocculation increased. *W. F.*

COSTADONI (Antonio). Ricerche sulla reazione di Henry per la malaria. [**Henry's Reaction in Malaria.**—*Riforma Med.* 1935. Sept. 28. Vol. 51. No. 39. pp. 1467–1470, 1473–1475. [95 refs.]

The latter part of this article, that in which the author gives an account of his own investigations, is of great interest. The first part treats of the devising of the reaction, of theoretical considerations as to its *rationale*, and of the findings and records of others.

Dr. Costadoni examined 184 sera. Fifty-four were from patients with malarial history, 32 actually suffering from malaria at the time of examination (31 with benign, 1 with subtertian infections), 22 had suffered in the past. Thirty sera were from subjects apparently in sound health and 100 were from patients suffering from diseases other than malaria.

In all those (32) with malaria the reaction, both melano- and ferro-flocculation, was positive. Of the others (22) eight had had attacks recently and the spleens were still enlarged although no parasites were seen in their blood; 7 of these were positive, the other doubtful. Another 14 had suffered from malaria some time before, as far back as the War. Of these two were definitely positive, one doubtful, and one reacted to one form only, the melano-flocculation: the rest were negative. These the author interprets as confirmation of cure. Two others had been under malaria treatment for syphilis. They were tested prior to inoculation, twice during the period of incubation, and during the early attacks, but invariably with negative results; they became positive after 4 and 6 febrile attacks respectively.

Among the 100 suffering from non-malarious conditions there were cases of syphilis in different stages, of malignant tumours (mostly carcinoma), of hepatic cirrhosis (multilobular), pernicious anaemia, leucaemia, etc. Unfortunately there was no opportunity of testing cases of trypanosomiasis, leishmaniasis, typhus or undulant fever (in which non-specific positive reactions have been recorded). Five among the hundred reacted positively, two with secondary syphilitic papular eruption, two others with chronic haemolytic jaundice and one with Weil's disease. In another patient, with Laennec's cirrhosis of liver, the melano-reaction was positive, but not the ferro-reaction.

H. H. S.

BRANDT (Robert) & HORN (Ludwig). Erfahrungen mit der Malaria-reaktion von Henry bei Impfmalaria. [**Henry's Reaction in Inoculation Malaria.**]—*Klin. Woch.* 1935. Oct. 26. Vol. 14. No. 43. pp. 1538-1540.

The authors consider that Henry's reaction gives very useful indications in inoculated malaria.

The work was done at Vienna at the instance of WAGNER-JAUREGG, the introducer of the malaria treatment of general paralysis, and was interrupted by the death of the second author. The authors used albuminate of iron and found that the dilutions advised by HENRY, were too great, a difference possibly due to the fact that inoculated and not natural malaria was in question. Details of their technique are furnished. The experiments concerned 50 malaria-treated patients and included 126 tests: the controls numbered 206. The results showed that all cases were positive during the malaria cure. The first change was noted at the 3rd-4th attack and the height was reached with the 5th-7th; all were strongly positive at the close. All again became negative with recovery from the malaria [whether natural or drug-caused is not quite clear]: the time taken for the change was 14 days to 8 weeks. Two cases were positive before the malaria inoculation. Of the controls half were Wassermann + and half Wassermann —. Among the latter the percentage of non-specific positives lay between 3 and 6. With the Wassermann positives on the other hand the Henry positives exceeded 11 per cent. The authors discuss their experiments from the standpoints of diagnosis and biology with special reference to the cure of general paralysis.

A. G. Bagshawe.

CASSUTO (Nathan). Sulla patogenesi delle recidive a lunghi intervalli nella malaria. Ricerche sperimentali sulla scimmia. [**The Pathogenesis of Malarial Relapses at Long Intervals.**]—*Riv. di Malarologia.* Sez. I. 1935. Vol. 14. No. 5. pp. 384-390. With 2 figs. on 1 plate. [12 refs.] English summary (9 lines).

Relapses may be regarded as of two types, one of which is of the nature of a recrudescence where a certain number of the malaria parasites survive treatment and continue to proliferate until they are sufficiently numerous to give rise to symptoms. The other type is demonstrated by the author's observations here detailed. He received a *M. rhesus* which had been inoculated in England with *P. knowlesi* in August 1934. Repeated search for parasites in the blood was negative, so a fresh inoculation of 2 cc. blood rich in parasites was made on January 7th, but still none were seen, and a third inoculation of 4 cc. on 19th January was equally barren of proof. The animal was splenectomized in March and survived the operation well but 10 days later the peripheral blood showed an enormous invasion with plasmodia and the monkey died. This is interpreted by saying that the animal was in a condition of "immunity equilibrium," and when extirpation of the spleen removed this defence the animal succumbed to a heavy infection. The spleen had showed malarial pigment, but less than that of another *Macacus* similarly infected and dead of it. A third monkey, like the first, did not show parasites in its peripheral blood although it had been inoculated 2 months before and examinations were made repeatedly, nevertheless its blood when inoculated into two other, healthy, monkeys gave rise to infection. It is held that in the cases of

the first and third the parasites are few and do not increase, owing to the immunological equilibrium until this is upset by operation, or, in nature, by some intercurrent illness or depressant. *H. H. S.*

VOLJENSKI (L.). Laboratory Experiments on the Application of Schist Products for the Destruction of Mosquito Larvae.—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 4. [In Russian pp. 316–320.]

The author describes the result of the application of various products of decomposition of schists, especially of the fraction of tar obtained after the separation of benzene, with a boiling point between 250° and 350°C., as larvicides. The extract was mixed with an equal amount of petroleum and applied to the surface of aquaria containing culicine larvae and pupae, the dosage being 30 cc. per cub. m. The destruction of the developmental stages of the mosquitoes proved to be considerably more rapid than in the control experiments using petroleum alone. Moreover, the pungent odour of the schist products protected the aquaria from being repopulated by mosquitoes for at least one month after treatment. *C. A. Hoare.*

MOCHKOVSKI (Ch.). La chimioprophylaxie du paludisme. [Prophylactic Chemotherapy of Malaria.]—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 3. [In Russian pp. 161–186. French summary pp. 186–187.]

This is mainly a review of our present knowledge regarding the use of chemotherapeutic agencies in the prophylaxis of malaria.

C. A. Hoare.

PINHO (Genserico de Souza). A prophylaxia chimica da malaria.—*Folha Med.* 1934. Nov. 25. Vol. 15. No. 33. pp. 385–389. [35 refs.]

REPETTO (R.). Un essai de prophylaxie individuelle de la malaria au moyen de l'association plasmochine-atébrine.—*Ann. Soc. Belge de Méd. Trop.* 1935. Dec. 31. Vol. 15. No. 4. pp. 537–539.

BARBOSA (Amando). Experiencias de lucha antipalúdica por los medicamentos, sin aplicación de ninguna medida antianotélica. [Fighting Malaria by Drugs in the Absence of Anti-Mosquito Measures.]—*Riv. di Malarologia. Sez. I.* 1935. Vol. 14. No. 4. pp. 352–368. With 7 graphs. [13 refs.]

In La Bazagona, Spain, malaria has been treated by drugs for the five year period 1930–34 and the results are recorded in this paper. Graphs give the prevalence of the forms—benign or malignant tertian—in different subdivisions of the district, but these need not be detailed. The general conclusions were that intensive treatment of patients suffering from benign tertian infection did not lessen the incidence by this type in the period under consideration. During that period all with subtertian infection were given combined quinine and plasmoquine, and the numbers attacked increased steadily year by year—such an increase was not seen when quinine alone was used. There is, consequently, no advantage in giving the combined drugs. The rise in number of cases in 1934 cannot, it is said, be attributed to the

fact that the duration of treatment was reduced, nor does immigration account for the endemic increase, but this question is not discussed in detail.

H. H. S.

FRANCHI (F.) & SAUTET (J.). Quinisation préventive et paludisme au cours de manoeuvres en pays palustre. [**Preventive Quinine during Military Manoeuvres in a Malarious Country.**]—*Bull. Soc. Path. Exot.* 1935. June 12. Vol. 28. No. 6. pp. 456-460.

The authors had experience of preventive quinine during manoeuvres in a malarious district in the south of Corsica, during 1934. They draw particular attention to the wastefulness of this method. If a French soldier contracts malaria he becomes automatically entitled to a pension, even though preventive quinine may have made the clinical symptoms negligible. Large doses must be given if they are to prevent symptoms; the dose given to French troops in Macedonia during the war was about 10 grains a day. The advantage of preventive quinine is that a soldier can be kept fit for duty over a special period. When the quinine is stopped the patient experiences a sudden attack of malaria without any stage of invasion; the authors call it "decapitated malaria."

W. F.

HILL (Rolla B.) & OLAVARRIA (José). **The Treatment of Malaria with Small Amounts of Quinine.** *Jl. Amer. Med. Assoc.* 1935. June 29. Vol. 104. No. 26. pp. 2329-2332. [14 refs.]

A three-year trial with a short treatment of 1 gram (15.5 grains) of quinine sulphate daily for 4 days was made at the malaria dispensary of Campo Lugar, a town of 1,200 inhabitants in Spain. The authors concluded that this short treatment was sufficient for fresh benign tertian infections, but that subtertian infections "should be treated for a longer period, while some other drug might be tried for the spring relapses."

W. F.

ADALJA (K. V.); GUPTA (Prafulla Kumar Sen). Intramuscular versus Intravenous Quinine. [Correspondence.]—*Indian Med. Gaz.* 1935. Sept. Vol. 70. No. 9. pp. 538-539.

VIGONI (M.). Ueber Erfahrungen mit Chinin-Weil bei Malaria. [**On Quinine-Weil in the Treatment of Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Oct. Vol. 39. No. 10. pp. 416-422.

Report on the results of treatment with quinine-Weil of cases of malaria in the Belgian Congo.

At the request of the firm producing quinine-Weil the author carried out a series of therapeutic tests with it amongst his patients in the Belgian Congo. The formula of quinine-Weil is $C_{20}H_{24}O_2N_2C_{16}H_{11}O_2N$. It is free from the bitter taste of quinine. In his observations he used a solution of 20:1,000. His patients were mainly infants and native children of the Congo. He grades the dose according to weight rather than age. From 3 to 15 kilograms the doses of quinine-Weil varied from 10 to 50 centigrams per day. The infection was chiefly due to *Plasmodium falciparum*; *Plasmodium malariae* was met with occasionally, chiefly in combination with *P. falciparum*; *Plasmodium vivax* was never found.

As a result of his investigations the author concludes that quinine-Weil (60 per cent. quinine base) appears to be very similar to quinine bihydrochloride in its action on the malarial infection. As in the case of quinine the gametocytes of *Plasmodium falciparum* are much more resistant to it than the schizonts, so that it is frequently necessary to use plasmoquine along with it. The advantages of the drug over quinine, particularly in the case of children, are absence of bitter taste and milder toxic actions, such as giddiness and ringing in the ears.

E. D. W. Greig.

MASSIAS (Charles), BOURGIN (P.) & NGUYEN-VAN-TAN. Traitement du paludisme par un dérivé acridinique (quinacrine) et un dérivé quinoléinique (rhodoquine). Nouvelles observations. [**The Treatment of Malaria by an Acridine Derivative (Quinacrine) and a Quinoline Derivative (Rhodoquine).**]*—Bull. Soc. Méd.-Chirurg. Indochine.* 1935. Feb.-Mar. Vol. 13. No. 2. pp. 79-82.

The treatment given by the authors consists of 5 days' quinacrine treatment, followed by 5 days' treatment with rhodoquine (a drug resembling plasmoquine) and quiniostovarsol. The rhodoquine and the quiniostovarsol are made up together into tablets, which are known as "Stovoquine." A saline purgative is given on the first day. The dose of quinacrine is 0.30 gram daily for adults, 0.20 for children between 5 and 10 years; 0.10 for younger children. The daily dose of rhodoquine is 0.005 gram for every 10 kilograms of body weight. The results of this treatment have been excellent, and the authors have observed no toxic symptoms.

W. F.

MARIAL (J. E.). La quinacrine dans la tierce maligne. [**Quinacrine in Malignant Tertian.**]*—Ann. de Méd. et de Pharm. Colon.* 1935. Apr.-May-June. Vol. 33. No. 2. pp. 301-325.

The author gives the details of 24 cases of malaria treated with quinacrine (the French atebrian) in French Indo-China. The dose was 0.1 gram, three times a day; the treatment was continued for 5 days in some cases, and for 10 days in others. There were no toxic symptoms and the results were excellent. The author draws attention to the national importance of this drug, the discovery of which has made France independent of foreign supplies of quinine and other anti-malarial drugs. He states that it causes the subtertian gametocytes to disappear from the blood. [This is probably a mistake due to the small number of cases observed. Atebrin has no direct action on crescents.]

W. F.

ROBIN (L.) & TRUONG-VAN-HUAN. Essais comparés de prophylaxie médicamenteuse antipalustre en région hyperendémique par la praequine, associée à la quinine ou à la quinacrine. [**A Comparison of Quinine-Praequine and Quinacrine-Praequine as Prophylactics.**]*—Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 650-658.

Quinacrine proved more satisfactory than quinine, but drugs cannot take the place of antilarval measures.

These experiments were carried out on an isolated rubber estate in the red-earth region of Indo-China. The strictest medical supervision ensured that the drugs were actually swallowed; the coolies

were not allowed to associate with people outside; no new labour was engaged during the period of the observation. Half the coolies were treated with quinine and the gametocidal drug praequine (which resembles plasmoquine); the other half were treated with praequine and quinacrine (which is identical with atebtrin). The treatment was continued for 5 months and then stopped. No antilarval measures were taken; the coolies used no mosquito nets; the carriers were *A. minimus* and *A. funestus*. The drugs had a beneficial effect in both groups, but the spleen-rate, the parasite-rate and the gametocyte-rate were much lower in the quinacrine group, and the coolies preferred quinacrine to quinine. The cost of treatment was approximately the same. No sooner were the drugs stopped than malaria began to increase, and within a couple of months it was rather worse than at the beginning of the experiment. The authors consider that if drug prophylaxis is to be efficient it must be carried on permanently and that there would always be danger of poisoning if the administration of synthetic drugs were not in the hands of medical men. They conclude that antilarval measures are the best form of prophylaxis and that the association of drug prophylaxis with these gives quicker results.

W. F.

DE MORAES (Carlos Vieira). A chimica synthetica a serviço da therapeutica da malaria. (A cura do impaludismo pela atebtrina e atebtrina-plasmochina.) [**Atebrin with and without Plasmoquine in Malaria.**]*—Ann. Paulist. Med. e Cirurg.* 1935. Oct. Vol. 30. No. 4. pp. 355–377. With 8 charts.

Eight cases are detailed, seven with *P. vivax* infection, one with *P. falciparum*. The point chiefly worth noting is that the author found the chloride of atebtrin given intramuscularly for 10 days in doses of 0.125 gm. more successful as a gametocide than atebtrin, possibly because when injected it was able to act more readily than the tabloids of the combined drugs.

H. H. S.

FERNANDEZ (Alberto J.). Notas practicas sobre el tratamiento del paludismo. Comunicación hecha en las reuniones de la Policlínica Caracas. [**The Treatment of Malaria.**]*—Rev. Policlínica Caracas.* 1935. Aug. Vol. 5. No. 23. pp. 1553–1558.

This was a paper communicated to a meeting of the Caracas Polyclinic and relates some personal experiences with plasmoquine and atebtrin in the treatment of malaria in Venezuela. Most of the cases were of patients suffering from severe first infections of *P. falciparum*. The author's experience coincides with that of others who have reported on these drugs.

H. H. S.

COMPAGNINI (G.). La chinoplasmina nella terapia della malaria —*Riv. di Malarologia*. Sez. I. 1935. Vol. 14. No. 5. pp. 404–423. French summary (7 lines).

DAWSON (W. T.), GINGRICH (Wendell) & HOLLAR (E. D.). **Intravenous Toxicity of Atebrin (Atebrin).***—Amer. Jl. Trop. Med.* 1935. Sept. Vol. 15. No. 5. pp. 515–520. [14 refs.]

Intravenous injections of atebtrin should be given only in emergency. The injection should be given slowly, and the dose should not exceed 0.1 gram. The toxicity of atebtrin intravenously is 20 to 40 times

greater than that of atebtrin by the mouth. [See BRIERCLIFFE, Ceylon Epidemic, *ante*, p. 218.]

The authors inoculated atebtrin into rabbits by the ear vein. They found that, provided the injection was made very slowly, 0.003 gram per kilogram was fairly safe. This corresponds roughly to 0.2 for an adult man. The injection of 0.005 gram per kilogram, if completed within one minute, caused a mortality of 20 per cent. It is not always safe to calculate directly from the figures obtained from animal experiments the doses which should be given to human beings. For example, rabbits may survive a dose of morphine amounting to 300 milligrams per kilogram of body weight given intravenously, but in man, 1 milligram is dangerous. Many references to papers on the toxicity of atebtrin are given. A patient of Eckhardt's tolerated a dose of 0.3 gram, but on the following day, 0.4 gram was followed 2 hours later by violent vomiting, collapse, weak pulse and stupor; he was revived by hot coffee, and there were no sequelae. The dangerous doses in milligrams per kilogram in laboratory animals are as follows:—*Rabbits*; by mouth, 400; subcutaneous 75; intravenous 7. *Cats*; mouth 200; subcutaneous 100; intravenous 10. *White mice*; mouth 1,000, subcutaneous 500; intravenous 50. The authors consider that in view of its slow excretion there should be an interval of 8 weeks between courses of atebtrin, and that it should be taken only under medical supervision.

W. F.

DE MURO (Paolo). L'atebtrin nella cura dell'infezione malarica. [**Atebtrin in Malaria.**]—*Riv. di Malariologia*. Sez. I. 1935. Vol. 14. No. 4. pp. 325–343. [87 refs.] French summary.

The action of atebtrin in 25 cases of malaria is discussed. Five patients were suffering with first attacks of benign tertian fever, another five with relapsed benign tertian, four from primary subtertian, five with relapsing subtertian, three with quartan and three with mixed benign and subtertian fever. The dosage employed by the author is: For children under one year $\frac{1}{2}$ tablet or 0.05 gm. daily, for those between 1 and 3 years $\frac{3}{4}$ tablet or 0.075 gm., 3–6 years 0.1 gm., 6–10 years 0.2, 10–12 years 0.25 and for adults 3 tablets or 0.3 gm., in each case given for 8 days. The usually recommended 5-day course he finds insufficient for the Agro Romano strain of parasite. He gives the drug in a single dose and never on an empty stomach. In the cases of benign tertian and quartan infections the fever is cut short in 2–3 days; in the subtertian not for 4–6 days. Few showed any intolerance; four exhibited a yellowish discoloration, one, suffering with relapsed benign tertian, complained of abdominal pain, and one, with primary subtertian, slight headache which lasted for 3 days.

H. H. S.

CHOPRA (R. N.) & ROY (A. C.). On the Estimation of Minute Quantities of Atebtrin in the Blood.—*Indian Med. Gaz.* 1935. Sept. Vol. 70. No. 9. pp. 504–505.

The atebtrin is extracted from the blood by means of ether. This is evaporated, and the residue is dissolved in decinormal hydrochloric acid. Caustic soda and amyl alcohol are then added. The amyl alcohol forms a supernatant layer which takes up all the yellow colour of the solution. This is compared with atebtrin solutions of known strength.

W. F.

VARDY (E. C.). **Notes on a Clinical Investigation of the Treatment of Malaria by Atebrin Musonate Injections.**—*Malayan Med. Jl.* 1935. Sept. Vol. 10. No. 3. pp. 67-77. With 5 charts.

Atebrin musonate was given to 50 serious cases. In 32 the patients were cured within 48 hours. In two the drug had no effect, and quinine was given. In two the drug may have had a toxic action.

Fifty patients at the Tan Tock Seng Hospital in Singapore were treated by injections of atebrin musonate. The manufacturers state that the two sizes of ampoules supplied by them contain a quantity of a very soluble atebrin salt corresponding to 0.1 gram and 0.3 gram, respectively, of atebrin hydrochloride. The acid constituent of this salt is without any toxic or therapeutic action. The daily dose for adults and for children over 8 years is 0.3 gram atebrin; for children up to 4 years, 0.1 gram; for children between 5 and 8 years, 0.2 gram. The daily dosage may be injected all at once. The total dosage recommended is 0.6 gram in 48 hours, then no more. For intravenous administration it is advisable not to exceed the single dose of 0.1 gram in adults. The injection should be made slowly, and two to three doses may be given in 24 hours. "In parenteral use," state the makers, "atebrin is best injected intramuscularly." Only two of the author's patients were given intravenous injections. Thirty-five were suffering from subtertian, 10 from benign tertian and 5 from mixed tertian. They were all selected for this treatment because they were seriously ill. Nevertheless, in 21 cases, a "temperature-pulse-rate response" occurred; that is to say, the temperature and pulse began to fall directly after the first injection and within 4 to 12 hours had reached a normal level; in a short time the patients were sitting up and asking for food. In 11 cases the temperature did not come down immediately after the first injection, but it did so after the second and remained normal until discharge. These two types of response the author calls Type I and Type II. In Type II, the pulse takes 48 to 72 hours to reach the normal rate. There were 10 patients who gave what the author calls a Type III response. Here the temperature took 3 or 4 days to come down, but when it was once down to normal it remained there. Finally, in 2 cases there was no response at all, and, after 0.9 gram had been given, they were treated with quinine. As regards the effect on the parasites: *P. vivax* disappeared in 2 or 3 days and *P. falciparum* in 4 or 5. In a healthy volunteer, the ordinary doses caused no destruction of erythrocytes, but, in the malaria patients, its administration was followed by a fall of 5 to 15 per cent. of haemoglobin, probably due to the destruction of infected corpuscles. One patient had a fit which may have been due to the drug. Another, with cardiac lesions, died 12 hours after his first injection. Atebrin was found in the urine within 2 hours of its intramuscular injection and the author therefore considers it unnecessary to give it intravenously. (See BLAZE and SIMEONS, this *Bulletin*, 1935, Vol. 32, p. 746; HICKS, *ante*, p. 235, and also BRIERCLIFFE, *ante*, p. 218.) W. F.

VAN SLYPE (W.). Du traitement du paludisme chronique de l'enfant noir par un nouveau sel d'atébrine. [**Atebrin Musonate.**]—*Bull. Soc. Path. Exot.* 1935. Oct. 9. Vol. 28. No. 8. pp. 701-705.

The author compares the action of atebrin musonate with that of atebrin dihydrochloride, or "atebrin for injection." He found that atebrin musonate had a much slower action, but he recommends it

for chronic cases. The powder keeps well in the tropics and the injections cause neither pain nor local reaction. [See report on Ceylon Epidemic, *ante*, p. 218.] W. F.

FERNANDO (P. B.) & WIJERAMA (E. M.). Death after Injection of Atebrin Mussonate.—*Lancet*. 1935. Nov. 9. p. 1056.

A man aged 20 was treated for malaria by two intramuscular injections of atebrin musonate which were given at Kurnegalle Hospital. He had no more fever until two months later when he was admitted to the General Hospital, Colombo, with a history of three days' fever, rigors and vomiting. His temperature was 99°F., his pulse 130, his skin was yellow and he was very ill. His urine contained no bile, albumen, or atebrin. No parasites were found in his blood. The direct and indirect van den Bergh tests were positive. He died two days later. All the tissues were stained yellow; atebrin was found in fluid from the pericardial and pleural sacs. No malaria parasites were found in the organs or tissues, but malaria pigment was present in the liver and spleen. The liver was moderately enlarged and congested. There were no macroscopic changes in the kidneys, but the microscope showed proliferation of the cells of Bowman's capsule. [The authors do not state how they satisfied themselves that the patient had received no atebrin prior to admission except the intramuscular injections two months before.] W. F.

CHOPRA (R. N.), SEN (B.) & GANGULI (S. K.). Tebetren in Indian Strains of Malaria.—*Indian Med. Gaz.* 1935. July. Vol. 70. No. 7. pp. 362-366.

Its action resembles that of quinine, but it costs much more. Tebetren "is a combination of acridine and quinine derivatives with a derivative of cholic acid." The authors treated 22 patients with 3 tablets 3 times a day for 5 days, and then kept them under observation for a fortnight. They found that "Tebetren resembles quinine and atebrin in its action on Indian strains of malaria . . . As compared with cinchona alkaloids the drug is much more expensive and appears to have no particular advantage over them." H. F.

USPENSKAYA (M.). Treatment of Quartan Malaria with Plasmocide.—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 3. [In Russian pp. 234-235.]

The author reports successful treatment of 32 cases of quartan malaria in the Caucasus with plasmocide. The course of treatment is divided into at least 4 cycles, in each of which the drug is given in doses of 0.03 gm. 3-4 times a day 3 days in succession, followed by an interval of 4 days without treatment. C. A. Hoare.

SCHULEMANN (Werner). Die Wirkung der synthetisch dargestellten gegen Malaria wirksamen Arzneistoffe.—*Riv. di Malariaologia*. Sez. II. 1935. Vol. 14. Supp. to No. 3. pp. 33-52. With 2 plates. [80 refs.]

KARAPETJAN (E. G.). Vergleichende Beurteilung der Behandlungsmethoden der Malaria.—*Arb. d. Tropeninstituts d. Volksgesundh. Kommissariat d. SSR. Armenien*. 1935. Vol. 2. [In Russian pp. 339-341. German summary pp. 367-369.]

RIOLO (Pietro). La terapia adrenalinica venosa delle splenomegalie malariche. [**The Treatment of Malarial Splenomegaly by Adrenalin Intravenously.**—*Riv. di Malariologia*. Sez. I. 1935. Vol. 14. No. 3. pp. 248-262. [11 refs.]

The author's routine for treating malaria patients with splenomegaly by means of intravenous injections of adrenalin was to start with 0.01 mgm. in 1 cc. distilled water and increase by 0.01 mgm. to 0.1 or even 0.2 mgm. if well tolerated. On reaching the maximum dose, this was repeated for some 20 days till the splenic enlargement disappeared or was no longer undergoing reduction. It was noted that the blood picture also improved and might even become normal.

The author treated 18 patients whose histories are given in this article. The degrees of enlargement were: I. Spleen palpable. II. Extending to "the lower half of the space between the costal arch and the umbilicus." III. Extending below the umbilicus. IV. To the iliac fossa.

Among the 18 there were: One in stage I, 7 in stage II, 9 in stage III and 1 in stage IV. In the one in stage I the spleen could no longer be felt at all; of the 7 in stage II, in 4 it could no longer be felt, in 2 it was just palpable, in one there was "marked reduction" [not defined]. Of the 9 in stage III, it was not felt at all in 3, just palpable in 4, and reduced to stage I in the other two. Lastly, in the case of the one with the great enlargement, stage IV, after treatment the spleen was only just palpable. Nothing is said of any other treatment, such as quinine, being given at the same time; the results seem to be due to the adrenalin only.

H. H. S.

CICCHITTO (Angelo M.). Contributo al trattamento delle splenomegalie malariche ai tropici. La soluzione citratata di Normet, sola o associata all'adrenalina endovenosa, nelle splenomegalie malariche croniche. [**Treatment of Malarial Splenomegaly.**—*Riv. di Malariologia*. Sez. I. 1935. Vol. 14. No. 5. pp. 391-403. French summary.]

The author refers to previous records in which reduction of an enlarged spleen due to chronic malaria was obtained by injections of Normet's citrate solution (sodium citrate 52 gm., magnesium citrate 10 gm., iron potassium tartrate 3 gm., manganese citrate 0.005 gm., aq. dest. one litre) and the modified formula (sodium citrate 22 gm., calcium citrate 6.5 gm., citrate of magnesium 4.5 gm., Ferri et ammon. cit. 1 gm., manganese citrate 0.005 gm., water a litre). He then mentions 20 patients in whom better results were obtained by combining the second formula of Normet with adrenaline intravenously, injections being given daily with increasing doses of adrenaline solution, starting with 1/100 mgm., then 1/90, 1/80, to 1/20 or even 1/10 mgm.

Of 60 Somalis 20 were given Normet No. 1, 20 Normet No. 2, and 20 Normet 2 + adrenaline. Among the first 9 showed marked and 5 slight improvement; of the second in 7 the spleen was reduced to normal limits, 9 showed a spleen reduced to 1-2 fingers' breadths below the costal margin and 4 were slightly reduced; with the combined citrates and adrenaline 13 had a spleen reduced to normal, 5 to 1-2 fingers' breadths below the ribs and only 2 showed but a slight reduction. Nine who had had "slight reduction" were some

months later given the mixed treatment ; in 4 the reduction was to normal, in 2 the spleen was still palpable below the ribs, in the other three there was no change.

H. H. S.

STARK (Wilhelm). Ueber Splenektomie bei Malariasplenomegalien. [**Splenectomy for Malarial Splenomegaly.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Sept. Vol. 39. No. 9. pp. 374–381.

An account of splenectomy in 32 cases of malarial splenomegaly.

The majority were between the ages of 20 and 40 years ; the youngest patients (2) were 12 years, and the oldest (2) 45 years. In addition to splenomegaly the following features were noted in the cases :—hepatomegaly (18), ascites (2), jaundice (2), marked cachexia and anaemia (3), cardiac changes, disturbances of the sexual functions, *viz.*, infantilism (2) and one obstinate case of eczema. The author describes the technique of the operation. He lost 6 cases, giving an operation mortality of 18·7 per cent. The clinical results of the operation were considered satisfactory. Red cells with Jolly bodies were noted in the course of his study of the blood changes following the operation. From his investigations he considers that in splenectomized patients the functions of the spleen are assumed gradually by other organs, such as the bone marrow and reticulo-endothelial system.

E. D. W. Greig.

SCHWETZ (J.). Recherches morphologiques sur un *Haemoproteus* spécial et deux *Plasmodiums* du hibou *Syrnium nuchale* et sur deux *Plasmodiums* du petit tisserin *Brachycope anomala* (Fam. *Ploceidae*). [**Researches on Avian Malaria.**]—*Riv. di Malariologia*. Sez. I. 1935. Vol. 14. No. 3. pp. 214–247. With 1 text fig. & 2 coloured plates. [14 refs.]

In 1930 the author described as *Plasmodium fallax* a new malarial parasite which he had found in the Belgian Congo in the owl *Syrnium nuchale*. It occurred in association with a *Haemoproteus* and resembled *P. circumflexum* subsequently described by KIKUTHI (1931) in its schizonts which occupied the length of the red blood corpuscle on one side of the nucleus. As the infection was a mixed one with a *Haemoproteus* it was difficult to determine the character of the gametocytes. The author has had an opportunity of studying 14 owls which were examined over varying periods. He has discovered that this owl is liable to infection with two species of malarial parasite one of which is *P. praecox (relictum)* and the other *P. fallax*, which, moreover, is unlike *P. circumflexum* in that it has elongate instead of rounded gametocytes. The *Haemoproteus* is identified as *H. syrnii* Mayer. The weaver bird (*Brachycope anomala*) was found to harbour two parasites, *P. praecox* and *P. elongatum*. The various parasites described are illustrated in two coloured plates. C. M. Wenyon.

HUFF (Clay G.). *Plasmodium hexamerium*, n. sp. from the Bluebird, inoculable to Canaries.—*Amer. Jl. Hyg.* 1935. Sept. Vol. 22. No. 2. pp. 274–277. With 16 figs. on 1 plate.

The new species of bird malarial parasite here described has as its main characters schizonts not larger than the nuclei of the red cells and producing very regularly six merozoites and elongate gametocytes.

P. vaughani and *P. tenue* are very similar but produce from 4 to 8 merozoites while *P. rouxi* invariably gives rise to 4 merozoites. It is possible that *P. tenue* is identical with *P. vaughani*, in which case it will be a synonym. The 4 parasites are closely related. The new species, illustrated in a plate, was studied in the canary in which it was isolated from a blue bird (*Sialia sialis sialis*). The parasite was also found in the Maryland yellowthroat, the catbird (*Galeoscoptes carolinensis*) and the mourning dove. C. M. W.

BUXTON (P. A.). **The Effect of *Proteosoma* upon the Survival of *Culex*.**—*Parasitology*. 1935. Oct. Vol. 27. No. 4. pp. 547–550.

The paper describes a number of experiments in each of which one group of *Culex fatigans* was fed on a bird, the blood of which contained gametocytes of *Proteosoma*, the other on an uninfected bird. In each case the mosquitoes fed on the infected bird showed a tendency to die earlier than the controls. It is pointed out that this observation has no immediate relation to problems of human malaria, but it should be easy to test whether an infection with the species of *Plasmodium* which occur in man, shortens the life of *Anopheles*. It appears to be possible that some species of *Anopheles* do not carry malaria in nature because they readily become infected, with results fatal to themselves. P. A. Buxton.

МОЧКОВСКИ (Ch.). Au sujet des méthodes de la chimiothérapie expérimentale du paludisme. [**Experimental Chemotherapy in Malaria.**]—*Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 639–650.

Investigations have been carried on in Moscow during the last 5 or 6 years in connexion with the synthesis of antimalaria drugs and their evaluation. Birds infected with *P. relictum* and with *Haemoproteus* have been employed for testing the action of the drugs on the schizonts and the gametocytes respectively. This paper describes the manner in which the value of a drug is calculated from: DT *dosis tolerata* = the maximum tolerated single dose; DTR *dosis tolerata repetita* = the maximum dose which can be repeated daily without danger; DP *dosis parasitocida* = the smallest single dose which causes the parasites to disappear; DPR *dosis parasitocida repetita*; DA *dosis affectans* = the dose which slows down the multiplication of the parasites; DR *dosis retardans* = the dose which delays the appearance of parasites in the peripheral blood; DRR *dosis retardans repetita*; DD *dosis disflagellans* = the dose which prevents exflagellation of gametes. W. F.

HAMID (E. A.). Old and New Remedies in the Treatment of Malaria.—*Bombay Med. Jl.* 1935. Aug. & Sept. Vol. 4. Nos. 8 & 9. pp. 134–138 & 145–150. [20 refs.]

SWEZEY (W. W.). **Intravenous Administration of Certain Drugs in the Therapy of Avian Malaria.**—*Amer. Jl. Trop. Med.* 1935. Sept. Vol. 15. No. 5. pp. 529–544. With 6 figs.

This concerns mercurochrome and 3 other drugs.

There have been many conflicting reports about the efficacy of mercurochrome in malaria; AVISON and KOO, of Severence Union

Medical College in Korea, have reported that all their cases were cured by intravenous injections of the drug. The author treated canaries infected with *P. cathemerium* and came to the conclusion that it was "not of sufficient value to warrant its use. This is also probably true of human malaria, but it may be of some value as an adjunct to other drugs or in cases where there is an idiosyncrasy to other malariacides." Carbarsone and vioform were also tested and found useless.

W. F.

- i. VAN ROOYEN (C. E.) & PILE (G. R.). **Observations on Infection by *Plasmodium knowlesi* (Ape Malaria) in the Treatment of General Paralysis of the Insane.**—*Brit. Med. J.* 1935. Oct. 12. pp. 662–666. With 2 charts.
- ii. BRITISH MEDICAL JOURNAL. 1935. Oct. 12. pp. 672–673.—**Monkey Malaria in G.P.I.**

i. Most patients were readily infected. The disease was quickly arrested by quinine, but, contrary to experience elsewhere, atebirin had no effect on it. The symptoms were milder than those of benign tertian.

Twelve patients were inoculated intramuscularly or intravenously with 3 to 5 cc. of blood containing *P. knowlesi*. The intravenous route is to be preferred. Some patients were inoculated with blood from other human cases, but, in most of them, the blood was obtained from a monkey by cardiac puncture. Infected, defibrinated blood, kept at 0°C. in the refrigerator, was still infective for a monkey after 16 days. The incubation period usually lasted for about a week. The fever was quotidian. It should be checked after the 8th rigor by a dose of quinine; "as little as 7½ grains of the drug given intramuscularly is sufficient to deal with a massive infection . . . Although the drug atebirin acted specifically in the monkey, its administration failed to diminish the pyrexia or inhibit the multiplication of parasites in cases of human infection." The susceptibility of the patients varied; the majority were readily infected, a few were more resistant, particularly two who had been previously infected with *P. vivax*. *M. rhesus* was reinfected with *P. knowlesi* after passage through two human patients.

ii. The strain of *P. knowlesi* employed by Drs. van Rooyen and Pile was brought to England two years ago, in an infected monkey, by Major G. Covell, I.M.S., and has been maintained at the London School of Hygiene and Tropical Medicine by passage through monkeys; it is still as virulent as when it was first introduced. Passage in man causes attenuation both for man and monkey. Infected blood has been sent through the post from London to various other centres in Europe and America; the maximum period successfully withstood was 12 days. Patients infected with *P. knowlesi* at Horton Mental Asylum by Colonel S. P. James and Dr. W. D. Nicol have not exhibited any such resistance to atebirin as is recorded by Drs. van Rooyen and Pile.

W. F.

NICOL (W. D.). **Monkey Malaria in G.P.I.** [Correspondence.]—*Brit. Med. J.* 1935. Oct. 19. p. 760.

P. knowlesi is not as useful as *P. vivax* or *P. malariae*, for the treatment of general paralysis.

Only about 45 per cent. of people who have never had malaria, and a still smaller proportion of those who have had it, are susceptible to infection with *P. knowlesi* transmitted by blood inoculation; moreover, in 25 per cent. of those infected, the attack is abortive and therapeutically useless. Passage from man to man lowers the virulence of the parasites, and, as it cannot be cultivated in mosquitoes, it would be necessary to go to the inconvenience of keeping monkeys if *P. knowlesi* were brought into general use. The employment of *P. vivax* can be regarded as both safe and efficient. W. F.

SOUTHERN MEDICAL JOURNAL. 1935. Aug. Vol. 28. No. 8. pp. 736-764.—**Symposium on Malaria.**

HANSON (Henry). **The Need for Continued Malaria Research** (pp. 736-738).

CRAIG (Charles F.). **Report of the Subcommittee on Malaria Research of the National Malaria Committee** (p. 739).

MELONEY (Henry E.). **Recent Research upon the Malaria Plasmodia** (pp. 739-742 [21 refs.]).

GINGRICH (Wendell). **Recent Research upon the Diagnosis of Malaria** (pp. 742-746 [37 refs.]).

CLARK (Herbert C.). **Recent Research on Therapeutics of Malaria** (pp. 746-749 [31 refs.]).

MAYNE (Bruce). **Recent Research on Malaria Therapy of Venereal Diseases. Review of Progress in the New Researches of Malaria Therapy of Venereal Disease** (pp. 750-753 [57 refs.]).

RILEY (George E.), FAUST (Ernest Carroll) & COOK (S. S.). **Some Recent Advances in the Epidemiology of Malaria** (pp. 753-757 [36 refs.]).

FAUST (Ernest Carroll) & DIBOLL (Celeste Goff). **Malaria Mortality in the Southern United States for the Year 1933** (pp. 757-763. With 2 figs.).

BOYD (Mark F.). **A Review of Malaria Control Activities in the Southern States during 1934** (pp. 763-764).

Misgivings concerning malaria control.

This symposium should be of great value to those interested in malaria because it contains reports from the subcommittee on the subject of malaria research during 1934 with references to a large number of papers published during that year. Particularly interesting are the paragraphs dealing with the treatment of early syphilis by therapeutic malaria, and the treatment of general paralysis by means of the radiotherm which, according to HINSIE and BLALOCK, gives better results than malaria.

Dr. Henry Hanson, State Health Officer of Florida, took the chair at the annual meeting of the National Malaria Committee, at St. Antonio, Texas, in November 1934. His opening address was definitely pessimistic. He said that the eradication of malaria was not appreciably nearer than it was when the Committee was formed in 1916; the best that could be hoped for was to accomplish a fair degree of control. He calculated that some 50,000 cases occurred annually in Florida. "What to do about it is the question asked by those responsible for furnishing funds for control. We ask, do we know what to do about it? Rashly, some would answer yes! . . . There are extensive areas where it is out of the question to use the Canal Zone methods as practised prior to 1919 . . . In Florida it is impracticable

to attempt a general drainage program . . . In Florida are large areas, some swamp, where no attempt should be made to control *Anopheles* by drainage, oiling or dusting . . . Individual protection must be resorted to, which almost without exception will be in the form of screening, that is, mosquito-proofing the house, and proper treatment of cases . . . The important thing is to choose effective preventive measures compatible with the economic status of the community concerned."

Dr. Mark Boyd reviewed the malaria situation in the south-eastern States. The drainage programmes of Georgia and Mississippi were given a tremendous impetus by the relief funds for providing work for the unemployed. "Owing to the hurried manner in which many of these projects were prepared and executed, time will be required to determine their actual effect on malaria incidence. All State activities are now confronted with the question of providing for the maintenance of this drainage, a problem of no mean magnitude . . . All in all, the present status of the malaria situation is disquieting. The rising incidence of the past few years indicates that the fairly steady decline experienced in the decade previous to 1931 can only to a limited extent be attributed to deliberate control work."

In an editorial on malaria incidence in the Southern States during 1934-5 it is stated that there were over 5 million cases during the year. Twelve hundred miles of drains were dug by labour working under the relief schemes, but it is feared that if these drains are not maintained they may become breeding places for *A. quadrimaculatus* and cause malaria instead of preventing it.

W. F.

SERGEANT (Edmond). La prémunion dans le paludisme. [**Pre-munion in Malaria.**—*Riv. di Malariologia*. Sez. II. 1935. Vol. 14. Supp. to No. 3. pp. 5-25. With 4 figs.]

Only when one has malaria is one immune to malaria.

The author discusses and contrasts three kinds of immunity. (1) Innate resistance. He proposes this term for a natural congenital immunity which exists apart from infection; such, for example, as the immunity of man to the parasites of bird malaria; (2) True immunity. He designates by this term, the post-infectious immunity conferred by certain infectious diseases, such as typhoid fever and scarlet fever after they have been cured and after the host has been sterilized. (3) Premunion. This term was proposed, in 1924, by the author, PARROT and DONATIEN to indicate an immunity which depends upon the continued presence of the infective agent in the body, and which ceases when that infection disappears. In syphilis, for example, an infected man is immune to superinfection, but directly he is cured his immunity disappears. In tuberculosis, too, the Calmette-Guérin living vaccine produces a mild latent infection, which, while it lasts, immunizes, but with the disappearance of the infection the immunity disappears too; the inoculation of dead vaccines produces no immunity in such diseases. In many protozoal diseases, such as piroplasmiasis and trypanosomiasis, immunity is of the same kind; it is a "premunion" due to the persistence of infection. The author then proceeds to discuss the question of immunity in malaria. He does not agree that the immunity of black races is due to an innate, congenital resistance, but considers that it is acquired by means of infections contracted in infancy. This immunity is not a "true

immunity," but is due to the persistence of malaria parasites; it is a "premunity." Premunity is concurrent with infection; it begins and ends with the infection. A single inoculation suffices to produce lasting premunity in bird malaria, but in man it must be sustained by repeated reinfections. W. F.

SINTON (J. A.) & HARBHAGWAN. **Studies in Immunity in Malaria. Part IV. The Results of Multiple Heterologous Superinfections, with a Discussion of their Relationship to Some Epidemiological Problems and to the General Principles of Treatment.**—*Records of the Malaria Survey of India*. 1935. Sept. Vol. 5. No. 3. pp. 307-334. [17 refs.]

Two or three infections with different strains produced protection against clinical manifestations of infection with most, but not all, other strains. The results of the experiments are considered in relation to human malaria. In ordinary tropical practice, it is unsafe to delay or modify treatment in an attempt to encourage the development of immunity. Prophylactic quinine is discussed.

The authors used monkeys which had already been inoculated with several strains of monkey malaria by MULLIGAN and Sinton (this *Bulletin*, 1934, Vol. 31, p. 462), and they repeated the inoculations until each animal had been inoculated with 6 strains. The inoculations were separated by an interval of 2 or 3 months. Six monkeys were employed, and in 5 of them no *clinical* relapse followed the second, or any later, inoculation with a heterologous strain. Usually, the heterologous strain produced a parasitic relapse without symptoms. The result of the inoculation of the 6th heterologous strain was to cause a transient increase of parasites in 4 cases; in one, it had no effect. The sixth monkey died from malaria after the inoculation of the 5th heterologous strain. The results "suggest that when an animal has acquired a tolerance to two or more of our different strains of *P. knowlesi*, a high degree of *protection* is produced *against the acute clinical manifestations* of superinfection. This protection . . . does *not*, however, appear to give an *immunity against superinfection* with all other strains of parasite in every case." It appears that each strain possesses several different immunological elements, some of which are common to other strains, and this explanation was put forward by MULLIGAN and Sinton (*ibid*). The authors suggest, however, that each of their so-called "strains" may really be a mixture of several pure strains, arising from a multiple infection with the same species in the original monkey host. They point out that all their animals came from the same area and that, consequently, the infections might merely represent mixtures of strains occurring in the natural environments of these monkeys. They consider that no general conclusions can be drawn to the effect that infections with 2 or 3 strains are sufficient to give a high degree of tolerance towards later infections with other strains of the same species.

They then discuss the results of their monkey experiments in relation to the treatment of human malaria, and the question of either allowing malarial infections to run on to spontaneous cure, or of giving only a minimal amount of treatment, with the view of allowing the development of tolerance. They are of opinion that "while such a procedure may be possible, safe, and advisable under special conditions, such as those in mental, and other well-equipped and well-staffed hospitals,

it does not seem suitable for routine use under the ordinary conditions of tropical practice." Where people live in areas of low endemicity and where reinfection with the same strain of parasite is unlikely to occur, they recommend that treatment should be directed towards the production of a radical cure. In regions of high endemicity, on the contrary, treatment should be limited to clinical cure in order to cut short the attack and obviate the risk of a fatal result. It is pointless to aim at a radical cure when reinfection is constantly occurring, and it appears that, in order to maintain tolerance, it is necessary for the individual to continue to harbour parasites. Where people are exposed to frequent infection over comparatively short periods, for example troops sent into malarious areas, clinical prophylaxis is recommended. Six grains of quinine daily may be sufficient for soldiers, but, for large undisciplined bodies of men, one must rely on larger doses given at longer intervals. Prophylactic treatment usually keeps the parasites below fever level, but they are numerous enough to stimulate the development of tolerance and, when the drug is stopped, the attacks which develop in those not radically cured will be usually less severe than those seen in primary infections. *W. F.*

DE SANCTIS MONALDI (Tullio). Ricerche sulla malaria sperimentale da inoculazione di sporozoi. [**Malaria experimentally set up by Inoculation of Sporozoites.**—*Riv. di Malarologia*. Sez. I. 1935. Vol. 14. No. 4. pp. 344-351. French summary.]

For these experiments sporozoites from the glands of *Anopheles* were inoculated into human subjects, some intradermally, some subcutaneously and some intravenously. Those of *P. vivax* were used. Subcutaneous injections in quantities from 2,500 to 100,000 were barren of result. Intradermal inoculation of 5,000 was followed 74 days later by an attack, but others injected with 50,000 and 90,000 exhibited no signs of infection. Intravenous inoculations of the same doses in 3 out of 7 cases were followed in 15 or 17 days by typical attacks. *H. H. S.*

SAUJET (Jacques). Influence du froid sur les oeufs d'*Anopheles maculipennis*. [**The Influence of Cold upon the Eggs of *A. maculipennis*.**—*C. R. Soc. Biol.* 1935. Vol. 120. No. 32. pp. 412-413.]

The author kept mosquito eggs at a temperature of 4°C. and controls of the same batch at ordinary temperatures. In the cold season, eggs laid by reactivated hibernating females hatched in 6 to 7 days at laboratory temperature, but if they were kept at 4°C. they did not hatch, even if they were taken out of the ice chest after 6 or 7 days at 4°C. and were then kept at ordinary temperature. In the hot season, eggs kept at 4°C. hatched in 15 to 25 days. The vitality of the eggs of active females is much greater than the vitality of the eggs laid by hibernating females. *W. F.*

POKROWSKI (S. W.). Essai d'obtenir les pontes hivernales d'*Anopheles maculipennis* en conditions de laboratoire. [**Obtaining Eggs of *Anopheles maculipennis* under Laboratory Conditions in Winter.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1935. Vol. 14. No. 3. [In Russian pp. 299-301. French summary p. 301.]

A. maculipennis var. *typicus* and *messeae* are the most frequently encountered mosquitoes in hibernation in central URSS. If provided

with a blood meal they can easily be made to deposit eggs at the laboratory temperature of 19°C. It is not necessary to raise the temperature of the surroundings, for example, to 26°C., in fact these temperatures seem to affect both the viability of the anopheles and the rate of maturation of the ova. The number laid under laboratory conditions is greater for *A. maculipennis messeae* (average 150) than for *typicus* (average 112), while in summer their infective averages are 263 and 293, reversing the order under laboratory conditions.

H. H. S.

ROZEBOOM (L. E.). **Infection of *Anopheles bachmanni*, *Petrocchi*, with *Plasmodium vivax*, Grassi and Feletti, and Observations on the Bionomics of the Mosquito.**—*Amer. Jl. Trop. Med.* 1935. Sept. Vol. 15. No. 5. pp. 521-528.

A. bachmanni is one of the white hind-footed anophelines that have been found in Panama in recent years. A favourite breeding place of these mosquitoes is within the crown of water lettuce, *Pistia stratiotes*. They bite viciously in the jungle in the daytime. The author infected them experimentally, but not so readily as *A. albimanus*, which were fed at the same time. The specimens which became infected were less heavily infected than *A. albimanus* which were fed on the same human case.

W. F.

DE BUEN (Sadi). Contribución de los servicios anti-paludicos españoles al conocimiento de la biología de los anofeles.—*Medicina Paises Cálidos*. Madrid. 1935. Dec. Vol. 8. No. 12. pp. 574-593. [46 refs.]

SWELLENGREBEL (N. H.). Le médecin et l'entomologie. [**The Doctor and Entomology.**]—*Riv. di Malarologia*. Sez. II. 1935. Vol. 14. Supp. to No. 3. pp. 73-86.

This is a delightful lecture. The author showed by numerous examples that a knowledge of entomology was essential to the study of malaria, but at the same time he warned his listeners that they should not become the slaves of systematic entomology.

An early example of the value of entomology to medicine was the establishment of the mosquito theory. An early objection to the theory was that the distribution of mosquitoes did not coincide with incidence of malaria, and that the theory failed on these grounds. Then GRASSI pointed out that not all mosquitoes but only anopheles carried malaria. Later on, the distribution of malaria and anopheles was studied by STEPHENS and CHRISTOPHERS in India. They found no malaria in some places where anopheles were most abundant, and much malaria in some places where there were very few. Again the mosquito theory was shaken, but these workers found that there were many kinds of anopheles, only some of which were carriers of malaria. The mosquitoes which swarmed in the places where there was no malaria were *A. rossi* which did not carry the disease, those in the malarious places were *A. listoni* which did carry it. It is a costly business to attempt to get rid of all the mosquitoes in a malarious place. All that is necessary is to find out which species is the carrier, and for this a knowledge of the entomology of the adults is necessary; then, control measures can be limited to dealing with the breeding

places of this particular species; for this a knowledge of the larvae is required. As an example of this "species sanitation," the lecturer mentioned a valley in the interior of Sumatra where malaria was endemic and mosquitoes were breeding everywhere. It was impracticable to deal with all the breeding places, but it was found that the only carrier was *A. ludlowi*, the larvae of which were limited to certain ricefields used as fish ponds. When these ponds were done away with, malaria disappeared; it was unnecessary to deal with the other anopheles. The north coast of Java is highly malarious. Two closely related anopheles are found there: *A. ludlowi* and *A. rossi*. *A. ludlowi* is responsible for the malaria, but *A. rossi* is not a carrier. Species sanitation is possible here, because *A. ludlowi* breeds in salt water only, while *A. rossi* breeds everywhere. The systematic entomologists recognize *A. ludlowi* and *A. rossi* as different species though the morphological distinctions are small; but they recognize no difference between the *A. ludlowi* of Java, which breeds only in salt water, and those of Sumatra which breed in fresh water, yet it is just this biological peculiarity which has made it possible to deal with malaria on the coast of Java. Thus a sanitarian may court disaster if he relies on systematic entomology alone, for a given species does not always behave in the same way in one country as it does in another. A striking example of this occurred on the East coast of Sumatra: towards the end of the War, the tobacco planters had great difficulty in feeding their coolies, and they decided to plant rice for their benefit. The rice fields in the plains of Java and Borneo breed swarms of anopheles, but there is no malaria because these anopheles are *A. hyrcanus* which does not act as a carrier there. In the deltas of the Yang-Tse and the Ebro, in Macassar and in the Celebes, this same mosquito is plentiful but harmless. Consequently the planters of Sumatra had no fear that the new rice fields on the East Coast plains, where *A. hyrcanus* breeds, would prove unhealthy. Unfortunately malaria soon appeared in epidemic form, and WALCH showed that the carrier was *A. hyrcanus* which he found infected in high proportion. It is also the principal vector in other parts of Sumatra. It is therefore different from the harmless *A. hyrcanus* of Java and other parts of the world, though from the entomological point of view it is the same. Professor Swellengrebel next spoke of the *A. gambiae* of South Africa which breeds in small pools of water, free from weeds and exposed to the sun, while the same species throughout the rest of Africa prefers the stagnant water of marshes. In conclusion, he touched upon the question of the fresh water (non-carrying) and the salt-water (carrying) races of *A. maculipennis* which are found in Holland. [See SWELLEN-GREBEL, *ante*, p. 221.]

W. F.

BAKER (F. C.). **The Effect of Photoperiodism on Resting, Treehole, Mosquito Larvae: (Preliminary Report).**—Reprinted from *Canadian Entomologist*. 1935. July. pp. 149–153.

The cessation of growth in the larvae of certain of tree-hole mosquitoes of North America during the winter is due in some way to the shorter period of daylight.

Eggs of *Aedes triseriatus* Say, laid in the late summer, would not hatch when placed in water in November, though all contained fully developed larvæ. Half the batch of dried eggs were then illuminated

artificially for six hours each evening for five weeks. On immersion in water great numbers then hatched, but very few of the unilluminated controls. Equally striking results were obtained with wintering larvae of *Culicoides guttipennis* Coq. and *Anopheles barberi* Coq. Those which were exposed in artificial tree-holes to a "16-hour day" began to grow and soon pupated. Larvae at the same temperature receiving only the normal amount of daylight showed no signs of growth.

From his experiments, which were very carefully controlled, the author concludes that the length of day is the dominant factor in initiating the rest period in the autumn and bringing about renewed growth in the spring in these larvae.

V. B. Wigglesworth.

MAGOON (E. H.). **A Portable Stable Trap for capturing Mosquitos.**—*Bull. Entom. Res.* 1935. Sept. Vol. 26. Pt. 3. pp. 363-372. With 6 figs. (4 on 1 plate).

"The stable trap, as introduced into Jamaica for capturing adult mosquitoes, is a small screened building with openings which trap the mosquitoes that enter in search of the domestic animal confined inside." The animal used is a donkey, mule, calf or horse. This portable stable is made of galvanized iron sheeting and wire gauze panels, on a wooden framework. The roof and sides are separate members, which can be bolted together for use by means of wing-nuts. Scale drawings, plans and specifications are given.

W. F.

GANGULI (A. C.). **Observations on Malaria-carrying Mosquitoes of Calcutta.**—*Records of the Malaria Survey of India.* 1935. Sept. Vol. 5. No. 3. pp. 213-222. With 2 maps & 2 charts. [11 refs.]

An example of man-made malaria in a town.

The following are the only species transmitting malaria in Calcutta : *A. stephensi*, *A. sundanicus*, and *A. varuna* ; *A. stephensi* is the most prevalent. There is an enormous number of galvanized iron cisterns in Calcutta, most of which contain unfiltered water for flushing privies. Others contain filtered water which the inhabitants have pumped up from the ground floor, because the supply of filtered water is intermittent and at low pressure. Larvae were found in about a quarter of 12,000 cisterns examined. In some houses water is stored in masonry cisterns on the ground floor and *A. stephensi* larvae were found in 16 per cent. of these. *A. stephensi* is rarely found in the most backward areas of the city, which are without a water supply ; it is most common in that part which is provided with a water-carriage system of sewage disposal and a supply of unfiltered water for flushing. In those areas which are supplied with filtered water only, and are without a water-carriage system, it is much less prevalent. *A. sundanicus* was found only in the eastern border of the city, near Salt Lakes. In almost all cases it was breeding in water which was only slightly saline. Most of the tanks in which it was found contained floating algae. It was most prevalent immediately after the rainy season. *A. varuna* was found in the south of the city, breeding in large tanks with marginal vegetation. No larvae could be found in tanks which were kept clean.

W. F.

PURI (I. M.). **Synoptic Tables for the Identification of the Full-grown Larvae of the Indian Anopheline Mosquitoes.**—*Health Bull. No. 16. Malaria Bureau No. 7.* 69 pp. With 81 figs. Second Edition. 1935. Delhi: Manager of Publications. [As.4 or 5d.]

In this edition the author has profited by experience of the errors of students during four years' use of the Synoptic Tables, at the Annual Malaria Class held at Karnal by the Malaria Survey of India, and a number of alterations have been made. The subject-matter of the pamphlet, which is wider than the title would imply, is dealt with under the following headings:—Structure of the Larva; Collecting and Rearing; Mode of Examination of the Larvae; Fixing, Preserving and Mounting; Identification of Larvae; Simple Synoptic Table; Advanced Synoptic Table; Important Recent Synonyms of Indian Anophelines; List of Indian Species, with Breeding Places and Distribution. In the first of the two tables, wherein brevity as well as simplicity has been studied, varieties are not included. With regard to the identification of larvae, while attention is drawn to the occasional usefulness of a knowledge of the breeding habits and distribution of the various species, the author rightly points out that "variations in the breeding habits are very common indeed. . . ."

It is only necessary to add that throughout Health Bulletin No. 16 the explanatory figures are clearly drawn, and that the work as a whole should prove useful to many in India besides those for whom it is primarily intended.

E. E. Austen.

WEYER (Fr.). Die Variabilität der Grosse bei den Rassen von *Anopheles maculipennis* unter natürlichen Bedingungen und im Experiment. [**Variability in Size in the Races of *Anopheles maculipennis*, under Natural Conditions and in Experiments.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Oct. Vol. 39. No. 10. pp. 399–408. [14 refs.]

Among the earliest morphological characters used to distinguish races of *A. maculipennis* was, in conjunction with the maxillary index, the mean size of the females. The most convenient way of measuring size is to take the length of the wing, and the author has already shown that the mean of this is not constant, but is subject to marked variation during the same year and from one year to another. This applies especially to the race *atroparvus*, which in North Germany was found to be slightly smaller than the race *messeae*, the difference, however, being by no means so pronounced as stated by Dutch authors. Although generally of theoretical rather than of practical importance, differences in size may nevertheless have a certain value when eggs are not available for comparison. Yet MARTINI and others have shown that external factors such as climate, larval food, colour of the bottom of the breeding-place, etc., are not without influence on the size of the adults, which also varies inversely with the temperature of the water wherein the larval stage was passed.

On measuring adults of *atroparvus* and *messeae* from two localities in North Germany where both races occur, considerable differences (e.g. 4.93 as compared with 5.29 mm.) in the mean length of the wings were found. But when in winter *atroparvus* females from two centres in East Friesland, where this race alone occurs, were examined, some of the mean wing-lengths were actually in excess of those previously registered for *messeae*. As regards the influence of climate in a more

extensive area, a comparison of Danish and North German specimens of *atoparvus* and *messeae* with representatives of the same races from Rumania and Italy showed that as the temperature rises the mean size diminishes, and *vice versa*. Experimental results (which, as pointed out by the author, are, for various reasons, less easily obtained than might be supposed) confirm, in the case of both races, the view that the mean size of the adult insects is subject to modification by external influences. Larvae hatched from the same batch of eggs produced larger imagines if allowed to develop at a lower temperature than that to which the water containing the remainder was exposed; and batches of under-nourished larvae developed into imagines materially smaller than those bred from well-fed larvae. While differences in mean size occurring in nature in representatives of the same race are thus explained, the reason why, in Germany at any rate, *messeae* has hitherto proved so remarkably constant in size is yet to seek.

E. E. A.

ROUBAUD (E.), COLAS-BELCOUR (J.) & TREILLARD (M.). Influence de la concentration en sel marin sur le développement larvaire d'*Anopheles maculipennis* (var. *atoparvus*, *fallax* et *labranchiae*). [The Influence of the Concentration of Sea-Salt upon the Development of the Larvae of *A. maculipennis* (var. *atoparvus*, *fallax* and *labranchiae*).]—*Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 568-571.

Diluted salt water is more favourable than fresh water to the development of all 3 varieties.

These experiments were made by putting larvae, two days old, into varying dilutions of sea-water, and observing if they thrived and how long they took to pupate. The varieties of *A. maculipennis* employed were *atoparvus* from the Vendée on the west Coast of France, *fallax* (*maculipennis*) from Normandy, and *labranchiae* from Italy. The larvae of *atoparvus* soon perished in concentrations varying between 9 parts of sea-water to 1 of distilled water, down to 3 parts of sea-water to 7 of distilled water. The optimum concentration was about 1 to 5, which was equal to a concentration of 6.54 grams of NaCl per litre. At higher dilutions, and in pure water, there was a heavy mortality. Even the sweet water variety, *fallax*, did not flourish in pure water. Here, the optimum concentration was 4.31 gram of NaCl per litre. With *labranchiae*, it lay between 3.45 and 0.86 gram per litre. In conclusion, it appears that a concentration of sea-water ranging between 1/5 to 1/20 is more favourable than pure water to all varieties of *A. maculipennis*. It may be because of its influence either on the flora of the water or on the surface tension and osmotic pressure.

W. F.

KRAAN (H.), DE BUCK (A.) & SWELLENGREBEL (N. H.). On the Fat- and Watercontent of Hibernating *Anopheles maculipennis* var. *atoparvus* and var. *messeae* in Holland.—*Riv. di Malarologia.* Sez. I. 1935. Vol. 14. No. 3. pp. 201-213.

In Holland during September and October adults of both var. *messeae* and var. *atoparvus* have what is known as "fat" in their adipose bodies, and in the case of *messeae* the bulkiness thus produced is so marked as to render this variety distinguishable at sight. "In some years at least 'fat' individuals may be found in equal number

among *messeae* and *atroparvus*, but in October 'fat' *messeae* contain more fat and water than 'fat' *atroparvus*." During winter, adults of both varieties suffer emaciation; but whereas in *messeae* this takes place slowly, and is really a matter of "'dehydration' because the loss of fat is slight compared with the loss of water it involves," individuals of *atroparvus*, which feed at intervals during hibernation, grow lean quickly as the result of losing equal proportions of fat and water. With the termination of hibernation in the latter half of February, females of *atroparvus*, "except for a certain disturbance in the water-fat balance," are much as they were in the previous autumn, and are quickly recovering from the deterioration in physical condition caused by their partial winter fast. On the other hand, "Unlike *atroparvus*, 'lean' *messeae* have not yet commenced to repair the losses sustained during the complete inanition lasting over the whole of the 6 months of hibernation. As a consequence they have now really turned lean, the loss of fat being greatly in excess of the loss of water." E. E. A.

MISSIROLI (A.). Nuova varietà di *Anopheles maculipennis*. [New Variety of *A. maculipennis*.]—*Ann. d'Igiene*. 1935. May. Vol. 45. No. 5. p. 333.

Professor Missiroli has recently been studying the Anophelines met with on the margins of Pergusa Lake, which is 670 metres above sea-level in the Province of Enna, Central Sicily. Of 165 oviposits from *A. maculipennis* captured near the lake 162 were of *A. maculipennis labbranchiae* and 3 of a variety not previously described and which he has named *A. maculipennis pergusiae*. The eggs are broader than those of *labbranchiae* and somewhat shorter, of a uniform grey colour, with a marked frill and striated air cells like those of *labbranchiae* but so small as to be seen only with difficulty, and they bear considerable resemblance to those of *A. mac. elutus*. "Examination of the male hypopygium and the morphological and biological characters of adults which we shall obtain by breeding will enable us to determine the characteristics of the new variety with greater precision." The present communication is merely a preliminary note. H. H. S.

WALCH (E. W.) & WALCH-SORGDRAGER (G. B.). De eieren van eenige Anophelinen in Ned.-Indië. [The Eggs of Certain Species of *Anopheles* in Netherlands Indies.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1935. Oct. 1. Vol. 75. No. 20. pp. 1700-1730. With 76 figs. on 6 plates (4 folding). [21 refs.] English summary.

The authors' summary is as follows:—

"1. This article contains a description of the eggs of 15 species of *Anopheles*, of which those of *A. albotaeniatus*, *umbrosus*, *punctulatus* and *leucosphyrus* were till now not yet known. Those new species we obtained from Borneo and New Guinea in paper with formaline. The eggs of *A. hyrcanus* var. *sin.* from Nanking (also preserved in paper with formaline) were described.

"2. There were observed some differences in the situation, number and form of the bosses of some species; especially those of the subgenus *Neomyzomyia* were clearly distinct from other kinds and those of *A. maculatus* were also more or less characteristic.

"3. Some differences were observed in the number, situation and form of the corrugations of chorion on the floats between some

sub-genera, viz., *Anopheles*, *Neomyzomyia* and *Pseudomyzomyia* (as far as we know them).

" 4. The micropyle on the other hand seemed in all species to be built in the same way.

" 5. The eggs of *tessellatus* and *kochi*, that were until now supposed to be identical, could be distinguished from each other, i.e., by the different breadth of the dorsal surface and of the frill.

" 6. The eggs of *A. annularis philippinensis*, about whose identity there existed some doubt, were described and proved to be the same as one of the batches described by CHRISTOPHERS and BARRAUD.

" 7. Eggs of *A. ludlowi* were obtained from Sumatra (fresh water) and from Batavia and Surabaja (salt water). The fresh water eggs showed some differences in length and number of ribs as compared with the salt water eggs (all taken together), but these differences were much smaller or non-existent between the fresh water eggs and the salt water eggs from Surabaja only, the latter being longer and having more ribs than those from Batavia.

" The pattern of the exochorion was the same in all eggs.

" 8. The eggs from *A. subpictus* from different places and especially from fresh and salt water showed big differences, consisting mainly in the pattern of the dorsal surface, the breadth of the frill and the number of ribs.

" To know for certain if we have to do with different races it will be necessary i.e. to breed them in more generations in order to see if those properties are hereditary.

" 9. The eggs of most species described here were the same as those from British India described by CHRISTOPHERS and BARRAUD, but some showed differences, viz. :—

" a. *Annularis typicus*.—The eggs here were smaller, showed a distinct double curve of the outline of the dorsal surface near the float terminations, not described by CHRISTOPHERS and BARRAUD, and also practically not indicated in their drawing ; and on the dorsal surface in most specimens of all the batches there could be seen a tigerlike pattern.

" b. *Vagus*.—It is possible that the frill of the *vagus* in this country is smaller than that in British India. At any rate it does not pass over the floats. And furthermore there is here a little distance between float and frill not existing in British India.

" c. *Subpictus*.—There was a big difference in the size of this egg compared with that from Bengal, where it is much larger (resp. 469 and 660 μ). The number of ribs was here much smaller, resp. 20.1 against 30–40 over there. The frill seemed somewhat different in structure. At any rate it was not 'slightly opaque or milky' here, nor 'stiff and thick,' but clear and fine.

" As between the *A. subpictus* from British India and the one from this country there exists also a biological difference, viz., that the one from British India does not carry malaria in nature while in this country it does, it is suggested that we may have to do here with a race (races) different from that in Bengal."

POGGI (Igino). La colorazione vitale delle uova di *Anopheles maculipennis* nella differenziazione delle singole varietà.—*Arch. Ital. Sci. Med. Colon.* 1935. Oct. Vol. 16. No. 10. pp. 722–726. With 3 figs. (2 coloured on 1 plate).

MONIER (H.) & TREILLARD (M.). *Anopheles (Myzomyia) funestus* var. *imerinensis* var. n. de Madagascar. [*Anopheles (Myzomyia) funestus* var. *imerinensis* a New Variety in Madagascar.].—*Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 572-573.

The authors describe an anopheline captured in large numbers at Antananarivo; they regard it as a new variety of *A. funestus* and have named it *imerinensis*. W. F.

SIMPSON (George) & ANDERSON (Archie S.). **Quinine Amaurosis.**—*Med. Jl. Australia.* 1935. Aug. 31. 22nd Year. Vol. 2. No. 9. pp. 290-291.

A case of complete but transient blindness.

A woman, 36 years of age, took about 50 grains of quinine with the object of terminating an unwanted pregnancy. She awoke next morning completely blind, but without tinnitus or any other sign of quinine poisoning. At 10 a.m. she was unable to distinguish light from darkness, and her pupils were widely dilated and fixed. Two and a-half hours later she could see a little, and by the next morning her vision appeared quite normal. No changes were found in her fundi then, or at a detailed examination made 18 days later. In many of the reported cases, a permanent constriction of the visual fields resulted, but in this instance there was none. In some cases, constriction of the retinal vessels occurs, in others, as in this case, the fundus is normal, and on these grounds it has been suggested that the quinine acts directly on the visual nerve elements. W. F.

PRESCRIBER. 1935. Sept. Vol. 29. No. 9. pp. 271-284. [48 refs.]—*Malaria: Abstract Reviews of Current Literature.* [Therapeutic Progress.]

COPELAND (A. J.). *Malaria and Racial Extinction.* [Correspondence.]—*Lancet.* Sept. 21. pp. 691-692.

LEPROSY.

LEPROSY REVIEW. 1935. Oct. Vol. 6. No. 4. pp. 149-197.
With 8 figs. on 2 plates.—Quarterly Publication of the British
Empire Leprosy Relief Association, 131 Baker Street, London,
W.1. [2s.]

An account of the Leprosy Institutions of Nigeria by H. C. ARMSTRONG. Itu is the largest settlement, under Dr. MACDONALD, with 1,600 inmates, each member of which has to do five hours' work on farms or the settlement industries for each injection he receives. The majority of the houses are also built by them. Goats supply milk, a liberal amount of which helps treatment. Road making, etc., provides work for all capable of it. A school for 150 children and night educational classes are provided, together with a Scout and Girl Guide movement, various games and a brass band. A church of Scotland to hold 1,300 has been built at a cost of £130. Babies born in the settlement are removed at once to a "clean" babies home, where their mothers go to suckle them with careful precautions to limit contact as much as possible. Treatment is carried out twice a week.

Another settlement at Uzuakoli with nearly 500 inmates, is supported from local administrative funds and provided with a medical officer by the Primitive Methodists, at a total cost of £4 a head *per annum*, for most of their food is grown on their own farm. Weekly injections are given. A new settlement has just been completed by the Nigerian Government at Ossiommo for 400 patients under the charge of a medical officer and a European sanitary inspector with public works experience. It is considered to be important to attract earlier cases to the colonies, as too many of the admissions are patients in an advanced stage who have been driven out of their villages, and will already have infected others.

Leprosy in South America is dealt with by W. E. BROWNING. The first Leprosarium in the New World is believed to have been founded near the beginning of the seventeenth century at Cartagena in Colombia. The following data regarding the present incidence of leprosy in South America are given.

Venezuela. Population 3,000,000; cases several thousand. A few hundred in two official leprosaria.

Colombia. Population 8,000,000. Probably about 30,000 cases. Over 4,000 in three leprosaria, but little expert treatment provided.

Ecuador. Population 2,000,000. Possibly several thousand cases but no data. One small leprosarium.

Peru and Bolivia. Little leprosy, mostly in warmer Amazon basin.

Chile. Mainland free from leprosy. Small colony on Pacific Easter Island.

Argentina. Population 12,000,000. Estimates of cases vary from 4,000 to 10,000. Census revealed 2,500 with only 250 in institutions. Most in warmer northern provinces.

Uruguay. Population 1,500,000. Recent estimate of over 500 cases. Under care 40.

Paraguay. Population 800,000. Cases 4,000 to 10,000. Leprosarium of 2,500 acres provided and under construction.

Brazil. Population 45,000,000. Cases not under 50,000. Many leprosaria.

The author thinks a total estimate of 100,000 lepers in South America is as exact as possible at the present time.

The vexed question of relapses in leprosy is considered, mainly from a theoretical point of view, by G. R. RAO in the next paper. He suggests that the term "disease arrested with deformities" should be substituted for "burnt out cases." He records four cases in which amputation of a septic foot in advanced quiescent nerve cases was followed by a recrudescence of the disease, and he gives a table of 20 relapses, 16 of which were neural cases. He thinks it probable that an "unrecognized non-acid fast neurotrophic virus form of *M. leprae*" exists.

D. P. DOW and J. S. NARAYAN suggest that gonorrhoeal arthritis may easily be mistaken for lepra reaction by lowering resistance.

E. S. R. ALFRED advocates giving fluorescein injections during intervals in the use of ethyl esters with a view to lessening the frequency and duration of lepra reactions after prolonged use of esters.

L. Rogers.

LEPROSY REVIEW. 1936. Jan. Vol. 7. No. 1. pp. 1-50. With 6 figs. (4 on 2 plates).—Quarterly Publication of the British Empire Leprosy Relief Association, 131 Baker Street, London, W.1. [2s.]

This is the first issue of this publication to be edited by Dr. E. MUIR, now Secretary of the British Empire Leprosy Relief Association. The following are the principal original articles in it. The Editor discusses the probable number of lepers in the world and concludes that they may be placed at two to four millions, the larger figure including early not easily recognizable cases. He points out that while clinics for out-patient treatment are suitable for such densely populated countries as India and China, in the more backward tropical African countries the colony system is the best.

Bacillaemia in leprosy is discussed by H. V. R. MOSTERT, who found they could be demonstrated in thick blood films more easily with Munch's modification of the Gram method than with the Ziehl-Neelsen method. He found them in all of five cases during an acute exacerbation, and as a rule only in nodular cases, while the method is of no practical value in diagnosis as the bacilli are much more easily demonstrated in the skin. In 48 per cent. of the positive cases the Wassermann reaction was also positive. They are most often found in the large mononuclear cells, and their presence in the blood is a very unfavourable sign.

F. G. ROSE records a brief reply to the critics of his paper on the Curability of Leprosy, and points out the errors some of them have fallen into. His twenty years' experience of work on leprosy leaves him in no doubt regarding the great benefits of the modern treatment.

A note on anti-leprosy work in the Punjab by S. S. JAIKARA is of local interest only. The remaining articles are extracts from other journals and newspaper cuttings.

L. R.

LEPROSY IN INDIA. 1935. Oct. Vol. 7. No. 4. pp. 147-191. With 5 plates & 9 figs.—Issued quarterly by the Indian Council of the British Empire Leprosy Relief Association.

J. RODRIGUEZ describes under the old term "lazarine leprosy" cases characterized by the formation of blisters, in the absence of burns or

rubbing, the fluid of which contains numerous acid-fast bacilli, and which tend to go on to deep sloughing ulceration, but without the usual signs of acute lepra reaction. Photos of the late stages are given.

D. P. Dow advocates the use of massage, electricity and diathermy in the treatment of the contractures of leprosy, and he describes and illustrates three cases with improvement in the condition of the hands.

E. B. CHRISTIAN records a study of family transmission of leprosy as seen at the Dichpali Leprosy Hospital, with a view to ascertaining if bacteriologically negative, as well as positive, cases can transmit the disease. A table gives the data of 57 families to show that in only 13 were both parents infected, in most of which there was a previous history of leprosy in both families, so conjugal infections were rare. Further in 11 families with one neural, non-infectious parent none of the 23 children showed any sign of leprosy, but of 110 children with one or both parents an infectious cutaneous case of leprosy no less than 101, or over 90 per cent., showed definite signs of the disease. Further the older the child when first exposed to infection the less likely is he to contract the disease. The two sexes suffered equally among the children. Infectious leper servants may also infect children. *L. R.*

ARQUIVOS DA ESCOLA MÉDICO-CIRURGICA DE NOVA GOA. Ser. B. 1935. No. 6. pp. 1381-1554. With 7 plates. A campanha antileprosa na Índia Portuguesa. [**The Anti-Leprosy Campaign in Portuguese India.**]

[Matter of general interest in this long report is very limited. Four-fifths are taken up with subscription lists and accounts of the opening and other ceremonies connected therewith nearly 9 years ago, even to the extent of giving details of the musical programs on ten occasions.]

The Central Leprosarium, Goa, was opened in May 1932 with 12 patients. In a table is given an analysis by age and sex of 107 examined in 1934. Sixty-six were males, 41 females; 41 of the former and 31 of the latter were between 21 and 45 years of age; there were none under 5 years and only 3 (all males) under 10 years of age. In a later chapter brief notes are given of 109 patients admitted between 17th May 1932 and the end of 1934. The subject of treatment is disposed of in a brief chapter of 5 pages, and the actual methods employed in 2 pages. The following have been tried:—

(1) Injection of cultures of Friedmann's bacillus and application by inunction, in 4 cases. No result was obtained.

(2) Antimonial, Sdt. 386 and Sdt. 386 B 6, were found to set up phlebitis. Stibanyl brought about slow cicatrization of ulcers; better results were obtained from intravenous injection of 1 per cent. mercurochrome.

(3) Methylene blue has proved disappointing, but the "moral" effect of the coloration of the nodules is good in making the patients think that cure is beginning.

(4) Chaulmoogra and its derivatives have proved of most service.

At present the plan followed is in the first place hygienic régime—good food, baths, rest, tonics, treatment of concomitant diseases such as malaria, dysentery, etc.—and dressing of ulcers. After 2-3 months of such preliminary measures specific remedies are started, as weekly intravenous injections of mercurochrome 1 per cent., 0.5 cc. rising by the same to 4 cc. for ulcers; alepol intravenously 1 cc. increasing to

5 cc. of 1 per cent. solution ; chaulmoogra oil, or ethyl esters, etc., the latter intramuscularly, the former in capsules with tablets of alepol in the intervals.
H. H. S.

SAINTE MARIE (P. E. Flye). *La lèpre au Maroc*. *Revue générale. [Leprosy in Morocco.]—Internat. Jl. Leprosy*. Manila. 1935. July–Sept. Vol. 3. No. 3. pp. 315–326. With 1 map. [26 refs.]

After reference to previous inquiries in Morocco the author is able to add 190 cases he had observed to bring the total in North Morocco up to 330. No part of the country is free, but the two main foci are in the North, and among the Doukkala tribe in the South with some 300 cases ; so the total is about 600. In the capital of Fez there are a number of pilgrim lepers. There is no restraint on their movements, and it is advised that they should be isolated under favourable conditions (but not imprisoned), preferably in agricultural colonies with treatment, and that the children should be from birth isolated in a special home.
L. R.

GRAHAM-YOOLL (M. A.). *Notes on the Leper Colony at Berhala, Sandakan, North Borneo.*—*Jl. Roy. Nav. Med. Serv.* 1935. Oct. Vol. 21. No. 4. pp. 334–342. With 5 figs.

The author visited, with the principal Medical Officer, the North Borneo Leper Settlement on the island of Berhala close to Sandakan. During the last five years the cases have increased from 53 to 72, mostly Chinese. A brief account is given of the usual types of the disease, and the patients are treated by injections of Muir's creosoted hydnocarpus oil and by alepol at weekly very welcome visits of the medical officer. The prognosis is naturally better in the early cases.
L. R.

STRACHAN (P. D.). *The Effect of Compulsory Segregation of Lepers in Basutoland.*—*South African Med. Jl.* 1935. Aug. 24. Vol. 9. No. 16. pp. 554–555.

In 1895 Dr. Long found not more than 200 leprosy cases in Basutoland, but when the leper asylum was opened in 1914 strenuous efforts of the chiefs resulted in 600 being admitted. In the mountainous Qachas Nex district the incidence is twice as high as in the more agricultural western areas, and the cases are more difficult to isolate. The improvement in economic conditions tends to decrease leprosy, but the administration efforts are counterbalanced by over-population. It is argued that on the law of compound interest "it is highly probable that in the period of 19 years the number of leprosy patients in the territory was trebled." Advanced cases are now rarely seen outside the asylum, and it is estimated that at the end of 1934 there could not be over 300 early cases outside, although apparently no surveys have been made, and it is argued that the 600 badly infected cases would in the 21 years to date have increased to 2,020, or more than double the present estimated numbers and of a worse type. The conclusion is come to that although "The cost of the Asylum has been a terrible drain on the resources of the territory," an extension of the present more successful inspectorate system of finding cases in the form of general health visitors "would eradicate leprosy sooner than any other system."
L. R.

CARTRON. Etude sur la lèpre, dans la circonscription de Dschang (Cameroun). Bamoums et Bamillékés. [**Leprosy Incidence in Dschang (Cameroons).**]—*Ann. de Méd. et de Pharm. Colon.* 1935. Jan.-Feb.-Mar. Vol. 33. No. 1. pp. 5-24.

The author found in the Dschang district 1 per cent. of 450,000 people infected, and 600 are isolated. In Grasfield there are at least 3,000, 1,500 being severe cases. L. R.

NOLASCO (J. O.). **The Leprosy Problem in the Philippines and Leprosy in Norway.**—*Jl. Philippine Islands Med. Assoc.* 1935. July. Vol. 15. No. 7. pp. 349-357.

The heavy cost of leprosy segregation in the Philippines has led the newly constituted Philippines Legislative Council to pass an Act "supposed to be patterned after the Norwegian system, but disapproved by the Governor-General." The author therefore draws attention to the great advantages Norway had of 77 years trial of isolation with home segregation not suitable to the Philippines, and about one-tenth the number of lepers, not living in a number of islands as in the Philippines; for these great differences make a fair comparison impossible. The Philippine plan has at least removed advanced cases from the towns, and now many admissions are voluntary for the sake of treatment in early stages, as compared with those isolated in the earlier years of the tests, and the larger numbers lately are no evidence of any increase of the disease, which at least appears to have been checked. Moreover the recent modifications of starting treatment centres and skin dispensaries for treatment of the earlier cases, together with the release of segregated ones which have become uninfected, has removed most of the objections of the people to the present measures, which deserve to be continued to give them a fair trial. Unfortunately two of the new treatment centres have been closed on grounds of economy.

L. R.

AUSTIN (C. J.). **The Problem of Leprosy in Fiji.**—*Native Med. Practitioner.* Suva. 1935. Sept. Vol. 2. No. 3. pp. 290-292.

The author had previously stressed the importance of early diagnosis in relation to prognosis and the eradication of leprosy, to allow of treatment in time to prevent the patient becoming infective to others. The want of this is shown by the number of advanced cases sent to the Makogai settlement. The native medical practitioners should also examine all contacts periodically for at least five years to detect and treat early cases, as well as discharged cases to find relapses. If these measures were regularly carried out "leprosy in Fiji will soon become a disease of the past."

L. R.

YU (K. Y.). **Indigenous Cases of Leprosy in Manchuria. Report of 4 Cases.**—*Chinese Med. Jl.* 1935. July. Vol. 49. No. 7. pp. 644-651. With 4 figs. on 1 plate & 1 map.

An earlier partial survey had failed to find a single indigenous case of leprosy in Manchuria, but four such cases are now reported among 23 new ones. L. R.

DOSTROWSKY (A.). **The Control of Leprosy in Palestine.**—*Harefuah*. Jerusalem. 1935. Sept.-Oct. Vol. 9. No. 5 (53). [In Hebrew. English summary pp. 6-7.]

This brief note records that from the establishment of the Lepers home in Palestine in 1896 up to 1927, 261 cases were treated, but 33 more were seen up to 1933, over 50 per cent. residing in Jerusalem. Of 26 Orientals 19 were born in Palestine. Chaulmoogra derivatives treatment is used, and isolation is considered imperative, and the disease is curable in the early stages. Examination of all the villagers where a leper is found is recommended. L. R.

WELCH (T. B.). **The State and Lepers in Malaya.**—*East African Med Jl.* 1935. Feb. Vol. 11. No. 11. pp. 353-356.

BURNET (Et.). **Un centre international d'étude de la lèpre. [An International Centre for the Study of Leprosy.]**—*Bull. Acad. Méd.* 1935. Dec. 24. 99th Year. 3rd Ser. Vol. 114. No. 42. pp. 846-850.

This brief paper announces the formation of the first centre for the scientific study of the leprosy problem in South America at Rio de Janeiro with the help of the League of Nations, under the charge of the dermatologist, Dr. Ed. RABELLO, who has studied the serology of leprosy. The co-operation of the Oswaldo Cruz Medical Research Institute, and of the well organized leprosy isolation institutions of the S. Paulo State with 5,000 cases in colonies, in which all the known infectious cases are under care, has been obtained. L. R.

TOLENTINO (Jose G.). **Sex Susceptibility in Leprosy.**—*Jl. Philippine Islands Med. Assoc.* 1935. July. Vol. 15. No. 7. pp. 374-377.

The author records his experience on this point at the Cebu treatment centre. For this purpose he made a survey of the incidence of the disease in 594 families, in 40 of which one or both parents were the source of infection. Of 132 sons 37, or 28.03 per cent., and of 119 daughters 21, or 17.65 per cent., became infected, so he agrees with Y. Hayashi (with 45 per cent. of sons and 32 per cent. of daughters) that males are more susceptible than females, all ages being included. He agrees that among children the sex incidence is equal, and he suggests that "in adults the sex hormones in females directly or indirectly render them relatively more resistant to infection than the males." He also thinks the demand of the system during puberty for iodine accounts for the frequent development of lesions at that time.

L. R.

MOISER (B.). **Tuberculoid Leprosy in Southern Rhodesia.**—*Internat. Jl. Leprosy*. Manila. 1935. July-Sept. Vol. 3. No. 3. pp. 279-282. With 3 figs. on 1 plate.

Since the visit of H. W. Wade in 1931, when one case of tuberculoid leprosy was found among 300 inmates, the author has met with only 6 out of about 700 patients; so the condition is rare in S. Rhodesia, while he had never noted such a case when previously working at leprosy in Nigeria. He notes a peculiar purplish colour of the lesions in

some of his patients, which, together with the raised edges, enables cases to be easily recognized. He agrees that acid-fast bacilli are rarely present, and the cases yield readily to treatment by intramuscular injections of iodized esters.

L. R.

SCHUJMAN (Salomon). "Lepra tuberculoide." Contribución a su estudio clínico e histopatológico. [**Tuberculoid Leprosy. A Clinical and Histological Study.**]—*Prensa Méd. Argentina*. 1935. Dec. 4, 11, 18 & 25. Vol. 22. Nos. 49, 50, 51 & 52. pp. 2347-2365; 2406-2424; 2465-2476; 2504-2518. With 71 figs. [15 refs.]

This long article does not permit of useful abstraction. It is concerned with the histories, clinical characters and general details of 21 cases of leprosy presenting tuberculoid lesions. The question of differential diagnosis from lupus, psoriasis, lichen, syphilis and other conditions is briefly discussed. The article is embellished with photographs and photomicrographs; the majority of these are well reproduced and very clear, demonstrating the clinical states of the patients, the macroscopic appearance of the lesions and the histological changes shown in sections obtained of tissue taken by biopsy.

The author shows that these cutaneous lesions are accompanied or characterized by altered sensibility, often resemble those of lupus and are very frequently bacteriologically negative [in so far as the bacilli are difficult of demonstration, they are present but are very few and sparse]. Clinically, the prominent, infiltrated margins of the lesion with altered sensation are highly characteristic, the centre being flat, atrophic or slightly achromic. The epidermis is often thin and sometimes atrophic, but the basal layers are infiltrated and the upper layers invaded by the infiltration. Commonly, the infiltration is around the hair follicles or sebaceous and sweat glands, and there is perivascular infiltration with swelling and proliferation of the vascular endothelium. In some cases the lesions appear to be a transitional stage to the formation of lepromata. Further investigation to determine whether this is so is to be undertaken.

H. H. S.

DUBOIS (A.); COCHRANE (R. G.); RODRIGUEZ (José); FRASER (N. D.). **The Abortive Case.** [Correspondence and Comments.]—*Internat. Jl. Leprosy*. Manila. 1935. July-Sept. Vol. 3. No. 3. pp. 357-360.

Dubois raises the question of how to deal with patients presenting a single small leprous looking macule which remains stationary for years, and considers they should be watched without treatment. Cochrane agrees, but Rodriguez questions the diagnosis in some such cases, and Fraser considers that it is not justifiable to withhold treatment, as some of them may be early leprosy which would develop if left alone.

L. R.

DES ESSARTS (J. Quérangal) & LEFROU (G.). Les sarcoïdes de la lèpre. [**Sarcoid Lesions in Leprosy.**]—*Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 626-639. [17 refs.]

The authors describe under this term lesions showing the structure of tuberculoid leprosy with epithelioid and a few giant cells without caseous changes, but in which the lesions may have advanced to a

popular or nodular stage. Notes of eleven cases are given and the histological changes described in detail, in six of them in the macular stage no leprosy bacilli were found, but they were present, in small numbers usually, in the five popular cases. The differential diagnosis is discussed, and the condition is considered to be a peculiar tissue reaction to Hansen's infection. L. R.

CHIYUTO (Sulpicio). **Early Leprotic Changes in Children and their Bearing on the Transmission and Evolution of the Disease. III.—***Monthly Bull. Bureau of Health.* Manila. 1935. July. Vol. 15. No. 7. pp. 217–234. With 1 chart. [16 refs.]

The author adds 42 new cases to the 40 he previously reported showing lesions, which he regards as very early bacteriologically negative signs of commencing leprosy, with a view to a study of the evolution of the disease and their bearing on transmission. In the case of the multiple hazy depigmented macules in 71·9 per cent. they became more visible, in 46·3 per cent. the border became slightly thickened, but in only 7·3 per cent. advanced to typically infiltrated pinkish macules, while in 8·5 per cent. tuberculoid zones were noted. Papulo-vesicular eruptions were confirmed as leprotic in 47·6 per cent. Minute pale follicular papules were interpreted as leprotic in 15·6 per cent. Superficial neurological changes, although not the first sign, were the first alarming symptoms in 57·8 per cent. His work supports the theory of infantile infection and adult immunity. L. R.

RODRIGUEZ (Jose). **Relapse of Leprosy under Controlled Conditions.**—*Internat. Jl. Leprosy.* Manila. 1935. July–Sept. Vol. 3. No. 3. pp. 333–336.

This brief report records that four out of five “negative” paroled leprosy patients living under good conditions with antileprosy treatment relapsed after from 4 months to 3 years. L. R.

VEERASINGHAM (K. V.) & RASANAYAGAM (S.). **Preliminary Observations on the Problem of Early Leprosy among Immigrants.**—*Malayan Med. Jl.* 1935. June. Vol. 10. No. 2. pp. 51–52.

At the Malayan Pulau Jerejak leper settlement 92 per cent. of the inmates are of foreign birth with 783 Chinese and 142 Indians, while 67 Chinese and 12 Indians were local born. During 1934 about 3,000 cases were treated at local institutions, and it is believed that the numbers are increasing, chiefly due to increased intake. Eurasians numbered 20 and Malay races 133. Late in 1934 a special examination was made at the Pulau Jerejak quarantine station for early leprosy among immigrants from S. India and 67 cases, 0·78 per cent., were detected among 8,537 adults, 65 of whom were early neural or maculo-anaesthetic, and only 2 of the cutaneous type. They were all repatriated at the expense of the agents. L. R.

MUIR (E.) & CHATTERJI (S. N.). **Bernhardt's Syndrome.**—*Indian Med. Gaz.* 1935. Apr. Vol. 70. No. 4. pp. 192–193. With 1 text fig.

A brief paper pointing out that an anaesthetic area in the upper outer thigh distribution of the lateral cutaneous nerve, described by BERNHARDT as due to constriction of the nerve by fibrositis of the muscle it passes through, or to syphilis, gonorrhoea or septic conditions, may

be mistaken for leprosy, but the absence of any other leprosy lesions will exclude that disease. Brief notes of 12 such cases are given.

L. R.

RIBEIRO (Leonidio). Um caso de lepra descoberto pela dactyloscopia. [**Leprosy discovered through Dactyloscopy.**]—*Folha Med.* 1935. Oct. 25. Vol. 16. No. 30. pp. 489–492. With 5 figs.

Detection of crime or discovery of criminals by finger-print identification is a matter of universal knowledge; the case here recorded is, as it were, a corollary of this—discovery of leprosy infection by alteration in finger-print. The subject was a woman who went as servant to Professor DA FONSECA in 1919 at the age of 16 years. Being unable to write she signed certain papers for the bank with her right thumb impression. In August 1935, *i.e.* 16 years later, wishing to take out some of the deposited papers, she was called upon to prove her identity by the thumb impression. A comparison was made but was not satisfactory and she was in danger of prosecution for attempted fraud. She was taken to Professor DA FONSECA for identification, who examined first the thumb-prints and then the patient and the diagnosis of leprosy was next day confirmed by Professor RABELLO.

H. H. S.

VESPOLI (Miguel). Ensaio de pathologia da lepra superinfecção. [**Superinfection in Leprosy.**]—*Rev. Leprologia de São Paulo.* 1935. Sept. Vol. 2. No. 3. pp. 173–184.

The author gives details of three cases of leprosy, all primarily of the nervous type, in whom after intervals of some years, 5 or more, other symptoms, of the nodular form, developed. The author concludes:—

1. It is undeniable that superinfection occurs in leprosy as in other infections.
2. Endogenous re-infection (superinfection) plays a large part in the evolution of leprosy.
3. Superinfection, as a factor in transforming latent into manifest disease, or of converting a quiescent case into one excreting bacilli, must not be underrated when we consider prophylactic measures.

H. H. S.

ESSER (P. H.). Psychose bij lepra. [**Psychoses in Leprosy.**]—*Nederl. Tijdschr. v. Geneesk.* 1935. Nov. 30. Vol. 79. No. 48. pp. 5554–5559. French summary (2 lines).

The psychoses which have been described as occurring in leprosy are: (1) the psychogenic psychoses; (2) the exogenous symptomatic (toxic) psychoses; (3) the remaining psychoses. To the first group belong the psychogenic depressions, the psychogenic paranoid psychoses, "imprisonment" psychoses, etc. The second group comprises the psychosis of KORSAKOFF in leprosy polyneuritis, leprosy neurasthenia, the mental deficiency pictures and the toxic and cachectic deliria in the terminal stages of the disease. The third group is the largest, and is a group in which the leprosy is merely incidental, for example the occurrence of leprosy in schizophrenia. Some observers have maintained that there is a fourth group, the organic, due to destructive leprosy lesions in the brain.

An illustrative case is cited of a young man with unsatisfactory upbringing and a drunken father who left Holland at an early age

to serve in India, led a dissolute life there and contracted leprosy. The disease was discovered after his return to Holland, where mental symptoms soon made their appearance. His case is describable as one of paranoid psychogenic reactive psychosis in conjunction with mixed leprosy. There was no evidence of his condition being due to a leprotic lesion in the brain. *W. F. Harvey.*

KEIL (Ernst). Lupus erythematodes discoides bei einem Leprösen.—*Arch. f. Dermat. u. Syph.* 1935. Sept. 20. Vol. 173. No. 1. pp. 34-36. With 2 figs.

TISSEUIL (J.) & BERNY (P.). Un enfant de 1 an, fils de lépreuse, porteur d'un nodule contenant des bacilles de Hansen.—*Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 549-550.

WALKER (Ernest Linwood) & SWEENEY (Marion A.). **Embryonic and Tumor Tissues as Culture Media for the Microorganism of Rat Leprosy.**—*Amer. Jl. Trop. Med.* 1935. Sept. Vol. 15. No. 5. pp. 507-513. [12 refs.]

After references to the work of others the authors describe their own results as follows. No multiplication of rat leprosy bacilli was obtained in minced embryonic tissues suspended in Tyrode solution. A pleomorphic acid-fast organism, identical with those they had obtained from human and rat leprosy did grow in those media, but better in a leaner medium than the minced embryo one. They suggest that the results claimed by others of cultures of lepra bacilli in these media were due to serial transfers of the abundant organisms, or to acid-fast organisms appearing in the cultures as contaminants.

L. R.

COWDRY (E. V.) & HEIMBURGER (L. F.). **Morphology of Bacillus of Rat Leprosy.**—*Proc. Soc. Experim. Biol. & Med.* 1935. June. Vol. 32. No. 9. pp. 1422-1423.

On staining by Gersh's Ziehl-Neelsen method, involving the instantaneous freezing of the tissue by plunging into liquid air and dehydration *in vacuo* while still frozen, the author found that the acid-fast bacilli of both leprosy and tubercle showed smoother outlines and much less granular appearance. This would appear to be their normal condition.

L. R.

KIKUTH (W.) & VERFÜRTH (D. H.). Ueber den heutigen Stand der Leprabazillenzüchtung. [**Present Position of Cultivations of *Mycobacterium leprae*.**]—*Deut. Med. Woch.* 1935. Sept. 6. Vol. 61. No. 36. pp. 1435-1438.

This is a review of literature on attempts to cultivate the leprosy bacillus, which contains nothing new.

L. R.

STEVENEL (L.) & BERNY (P.). Un procédé de biopsie cutanée chez les lépreux. [**Obtaining Fragments of Skin for Examination for Leprosy.**]—*Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 547-548.

A simple method of obtaining a small fragment of leprosy tissue for sectioning without much inconvenience or fright to the patient is thus described. A needle is inserted into the superficial layer of

the skin parallel with the surface and the point made to emerge one or two millimetres from the point of entrance. A thin portion of the skin is thus raised and a slice removed by a razor following the direction of the needle as closely as possible. The insignificant wound is covered with collodion and cotton wool.

L. R.

SABIN (F. R.), SMITHBURN (K. C.) & THOMAS (R. M.). **Cellular Reactions to Waxes from *Mycobacterium leprae*.**—*Jl. Experim. Med.* 1935. Dec. 1. Vol. 62. No. 6. pp. 771-786. With 4 figs. on 1 plate.

This technical paper describes the cellular reactions to the intra-peritoneal injection into rabbits of five preparations of the waxy substances separated from cultures of an acid-fast strain of *Myco. leprae* isolated from a case of leprosy. The authors conclude that, like the waxes of the tubercle bacilli, those now tested are remarkable stimulants to cells. The crude wax is a mixture of lipoids and other materials and gives reactions similar to the response to the tuberculo-poly-saccharide, phosphatide and wax; as does the wax obtained from purification of the lepra-phosphatide, but with more giant cells. Leprosin, though a glyceride, corresponds to the unsaponifiable material from the tubercle bacillus. It stimulates both fibroblasts and monocytes, and the latter fuse into foreign body giant cells to engulf the wax. The cellular reaction to the leprosinic acid and to the crystalline alcohols is one of the foreign body giant cell.

L. R.

ANDERSON (Hamilton H.) & ANDERSON (Jeanette van D.). **Iodine Values and Total Lipids of Leprous Human Blood Sera.**—*Proc. Soc. Experim. Biol. & Med.* 1935. June. Vol. 32. No. 9. pp. 1470-1473.

The authors have determined the iodine values and serum lipids of leprous patients receiving chaulmoogra therapy with the following results:—

*Average Iodine Values and Total Lipids of Blood Sera of 53 Patients under Treatment for "Cutaneous" (Mixed) Leprosy at Palo Seco Leper Colony, Panama **

Stage and Course of Disease.	No. of patients.	Av. age in years.	Av. weight in kilos	Av. hgb. gm 100 cc	Probable average duration of disease in years.	Probable av amount of chaulmoogra esters given in kilos.	Iodine Value.	Total lipids Gm./100 cc.
Early Predominantly Cutaneous Leprosy†	18	30.1	57.2	12.15	4.1	1.44	50.1-13.6	0.995±0.129
All Stages—improving‡	13	30.4	59.9	11.85	5.3	1.67	54.5±18.1	0.813±0.194
Advanced—stationary	11	31.9	56.2	11.02	9.4	2.25	66.9±14.1	0.720±0.200
All stages—advancing	11	33.1	58.7	12.67	9.8	2.74	77.8±19.8	0.572±0.148

*Normal values: Total lipids, 0.589 Gm/100 cc.; Iodine value of total fatty acids, 88. (BOYD, E. M., *J Biol Chem*, 1933, 101, 323)

Average values for 53 leprous patients: Total lipids, 0.805±0.161 Gm./100 cc. Iodine value, 58.5±15.9.

†Three patients untreated

‡One patient with lepra fever. Iodine value, 31.2; total lipids, 1.016 Gm/100 cc.

Advanced treated cases showed greater unsaturation of the blood fatty-acids and lower total lipids, but the findings are masked by the large amounts of chaulmoogra administered. L. R.

SPINDLER (A.). **The Pathogenesis of Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1935. July-Sept. Vol. 3. No. 3. pp. 265-278. With 1 fig. [12 refs.]

Under this heading the author discusses the mode of infection of leprosy, and comes to the conclusion that it is due to exposure to infection by a leper after the importation of a case into a previously unaffected area, aided by a predisposition, as only a small percentage of exposures result in actual infection. He thinks this predisposition is hereditary. L. R.

GOMES (J. M.). **The Gomes Complement-Fixation Test in Contacts of Lepers.**—*Internat. Jl. Leprosy.* Manila. 1935. July-Sept. Vol. 3. No. 3. pp. 283-290.

Observations on 56 cases led to the following conclusions. The test is not absolutely specific as fixation occurs in cases of tuberculosis, ozaena, deep mycosis, tropical ulcer and leishmaniasis; but all except tuberculosis present characteristic differential symptoms. In the search for home infections among the contacts of leprosy persons such serological evidence is of great importance, for the search for lepra bacilli in lymph nodes is difficult to carry out and the organisms are only occasionally found there. L. R.

VAN DEN BRANDEN (F.). Réaction de déviation du complément et réaction de flocculation effectuées simultanément sur du sérum de lépreux. [**Complement Fixation and Flocculation Tests in Leprosy.**]—*Ann. Soc. Belge de Méd. Trop.* 1935. Sept. 30. Vol. 15. No. 3. pp. 391-396.

After references to some previous French observations, the author records that he obtained 36 per cent. of positive results with the Kahn reaction and 22 per cent. with the Bordet-Wassermann, while two sera were anti-complementary. He thinks the positive reactions are mainly due to the great prevalence of syphilis and yaws in the Belgian Congo. L. R.

DUBOIS (A.) & DEGOTTE (J.). Séroflocculation syphilitique chez les lépreux (spécialement antigène-Bruxelles-flocculation). [**Sero-flocculation in Leprosy.**]—*Ann. Soc. Belge de Méd. Trop.* 1935. June 30. Vol. 15. No. 2. pp. 201-207.

The authors report on seroflocculation by three methods, that of Meinicke (M.T.R.), of Kahn and with the Antigen-Brussels-Flocculation (A.B.F.) in non-syphilitic and in syphilitic and yaws infected non-lepers and lepers, and record tables of their results, from which they come to the following conclusions: Positive reactions are evidence of infection with syphilis or yaws, for in accordance with the preceding history there is a difference between those with a positive and a negative history of those diseases in the results of from +25 to +70 per cent. The percentage of results is approximately the same whether lepra bacilli are rare or numerous, which should not be the case if the leprosy infection influenced the results. The great

frequency of yaws doubtless explained the positive results that were met with in lepers, for the positive results in lepers of about 50 per cent. is the same as in the general run of patients in the hospital. Treatment with anti-syphilitic remedies should furnish confirmation. The Kahn method appears to be the most specific of those tested, the A.B.F. one the least so; this result is in agreement with the findings of Bernard and Van den Branden. L. R.

LIMA (Lauro de Souza). A sorologia da sífilis em face do tratamento antileprotico. [**Serological Tests for Syphilis in Lepers under Treatment.**].—*Rev. Leptologia de São Paulo*. 1935. Num. especial. pp. 183–185.

MONTSERRAT has stated that leper patients whose sera are positive by the Wassermann or Kahn tests for syphilis may become negative as the result of prolonged administration of oil of chaulmoogra. The author proceeded to test this on patients at his leprosarium. Forty-seven were chosen in whom syphilis was suspected and whose sera gave a positive W.R., and 17 others Kahn positive. After treatment with chaulmoogra for periods of 6 to 24 months (total dosage of 100–500 cc.), the reactions were tested again. Of the W.R.+, 11 were unchanged, 36 showed a reduction, and of the 17 Kahn+ the corresponding figures were 4 and 13. He therefore postulates two questions: 1. How can we confirm a suspected diagnosis of syphilis in lepers? 2. What guide have we of the results of antisyphilitic treatment in lepers?

At the Padre Bento Sanatorium the rule appears to be to group the patients as follows:—

1. Those with a clinical history indicating syphilis and confirmed by a positive serum test. They are treated for syphilis and leprosy alternately; an insoluble salt of bismuth (the hydroxide) is given for 1½ months, then 2 months' interval during which the treatment for leprosy is given.

2. Those with a doubtful clinical history of syphilis, whose serum is negative. Here the difficulty is great and the usual rule is to give six injections of bismuth, note the result and test the blood again, 14 days after the last injection. [Presumably, if the symptoms clear the syphilitic diagnosis is confirmed; if not are the symptoms to be regarded as due entirely to the leprosy, if the W.R. remains negative, as it probably would if it was so before the bismuth was given? The reason for testing the reaction again is not obvious.]

3. Those with a clinical history of syphilis, whose sera give varying results. Treatment of these is guided by the Kahn reaction: (a) If the leprosy is of mild form and the Kahn negative the syphilitic aspect is disregarded. (b) If the Kahn is + or ++, antisyphilitic treatment is started if that for leprosy appears to be doing no good. (c) If a strongly positive, +++, antisyphilitic treatment is taken in hand whatever the stage or condition of the leprosy. H. H. S.

FABIANI (G.). La valeur des réactions de gélification sérique au cours de la lèpre humaine. [**The Value of the Formol-Gel Test in Human Leprosy.**].—*C. R. Soc. Biol.* 1935. Vol. 120. No. 29. pp. 13–14.

The gelification of sera on the addition of 2 drops of 40 per cent. formaldehyde or 0.1 per cent. lactic acid in leprosy is reported on.

The author concludes that the reactions with both agents give parallel results of very variable degrees, but the test is of little practical value because similar results are obtained in tuberculosis, syphilis and kala azar.

L. R.

BIER (Otto G.). Ueber die Serologie der Lepra. IV. Einfluss der Temperatur auf die Reaktionsfähigkeit des Lepraserums mit Tuberkulose- und Lues-Antigen. [*Serology in Leprosy. Reactions of Antigens of Tuberculosis and Syphilis with Leper Sera.*]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Dec. Vol. 39. No. 12. pp. 516-519.

The author reports having obtained 60 per cent. of reactions with lepra tubercle antigens of Witebsky, Klingenstein and Kuhn. L. R.

BESTA (Bruno) & MARIANI (Giacomo). Il valore pratico della reazione di Rubino per la lebbra, studiato in Somalia. [*Rubino's Reaction among Lepers in Italian Somaliland.*]—*Giorn. Ital. di Malat. Esot. e Trop.* 1936. Jan. 31. Vol. 9. No. 1. pp. 11-14.

The first part of this article gives a review of the results of Rubino's reaction which have been reported by investigators in different parts of the world. The authors next describe the technique of the modified form, R.R.II, and the scheme which they followed; this is set out in the subjoined table.

Tube	1	2	3	4	5	6
Serum	0.50	0.25	0.10	0.50	0.25	0.30*
Saline	0.30	0.55	0.70	0.30	0.55	0.70
Formolized suspension	0.20	0.20	0.20	—	—	—
Saline suspension	—	—	—	0.20	0.20	0.20

* So in table, but probably a misprint for 0.10—Ed.

They find that waiting for an hour before reading the results does not give safe results; they read after 15, 30 and 50 minutes. They examined 400 sera: 301 normal, 29 syphilitic, 10 from tuberculous patients, 10 with chronic malaria, 46 proved lepers and 4 suspected of leprosy. None of the 350 in the first four of these gave a positive. Of the 46 from lepers, proved to be such both clinically and bacteriologically, 24 only (52 per cent.) gave a positive, 22 (48 per cent.) were negative. Fourteen of the 46 were nodular cases and only 4 were positive; of 12 nerve cases only 2, but of 20 with the mixed forms 18 were positive. In general, the more advanced the stage of disease the greater the proportion positive. [No further reference is made to the 4 suspected cases.] Treatment seemed to have little effect on the result. The reaction, therefore, has little value either in diagnosis or in evaluating the results of treatment. [See also this *Bulletin*, 1930, Vol. 27, p. 1006; 1931, Vol. 28, p. 961; 1932, Vol. 29, p. 850.]

H. H. S.

WATANABE (Yoshimasa). **Experimental Studies on Animals concerning Leprosy, Report III. The Effect of Potassium Iodide on Animals Inoculated with Leprosy.**—*Kitasato Arch. Experim. Med.* 1935. July. Vol. 12. No. 3. pp. 304–312.

The author reports that when rats are repeatedly inoculated with rat or human lepra tissue the former produces generalized rat leprosy, but the latter only a temporary bacillus-containing nodule at the site of the injection. The weekly injection of iodide of potassium in 0.05 gm. per 100 gm. body weight caused a temporary increase in the leprosy lesions in both cases. *L. R.*

WATANABE (Yoshimasa). **Experimental Studies on Animals concerning Leprosy, Report IV. Allergy and Inoculation of Lepra Materials.**—*Kitasato Arch. Experim. Med.* 1935. Oct. Vol. 12. No. 4. pp. 355–361.

This worker finds that the inoculation of insusceptible rats with emulsions of human leprosy nodules produces only a mild and temporary reaction in the form of a small localized nodule, but on repeated inoculations with the same strain the reaction becomes stronger and the nodules larger and more persistent. Further, when monkeys are inoculated with either human or rat leprosy material the immediate reaction subsides in a day or two, but after an interval hard nodules appear at the site of inoculations. With repeated inoculations the initial reaction is not absorbed, but a hard nodule is formed, which may even go on to ulceration. The rat strain caused stronger reactions in monkeys than the human one. He concludes that an initial inoculation of leprosy emulsions into white rats and monkeys causes a certain degree of subsequent allergy. *L. R.*

SOULE (M. H.). **The Relationship of Human Leprosy and Rat Leprosy. A Study of Wild Rats captured in the Culion Leper Colony.**—*Internat. J. Leprosy.* Manila. 1935. July–Sept. Vol. 3. No. 3. pp. 291–310. [30 refs.]

The possibility of infection of rats naturally with human leprosy has been examined in the very favourable conditions of the Culion Leper settlement with negative results, for 212 trapped rats showed not a single leprosy infection. Moreover, inoculations of abundant human lepra bacillus-containing tissue into 23 Culion rats, and 11 control rats on another island, all gave negative results. Although rats can readily be infected by the inoculation of small quantities of rat leprosy material, all efforts to cultivate the organism failed. The author rejects the claim of Walker and Sweeney to have cultivated the organism of leprosy. *L. R.*

NAKAMURA (K.), KOBASHI (S.) & MATSUMOTO (I.). **Inokulationsversuche der Menschenlepra auf Hausratten. II. Mitteilung. [Inoculation of *R. norvegicus* with Human Leprous Material.]**—*Japanese J. Experim. Med.* 1935. Oct. 20. Vol. 13. No. 5. pp. 619–628. With 13 figs. (2 coloured) on 5 plates.

This paper deals with the inoculation of human leprosy material into young house rats (*Rattus norvegicus norvegicus*) after the removal from them of the thyroid gland and the parathyroids. Of 34 rats so

treated 17 or 50 per cent. developed leprous lesions with a clear picture of granulation tissue in the skin, testicles and lymph-glands containing innumerable lepra bacilli and globi in the affected areas. This shows that their susceptibility was increased by the previous operation, for unoperated control animals did not contract the disease, although long continued efforts were made to infect them. Further tests were made in the case of healthy young white rats after removal of the thyroid gland with negative results, although it was easy to infect the house rats under similar conditions. L. R.

WAYSON (N. E.) & MASUNAGA (Eichi). **Rat Leprosy. Observations concerning Transmission of the Infection through the Nose.**—*Public Health Rep.* 1935. Nov. 8. Vol. 50. No. 45. pp. 1576–1581. With 4 figs. on 2 plates.

This is an interesting inquiry into the natural modes of infection of rat leprosy. The author concludes: 1. Acid-fast bacilli have frequently been found in the noses of wild rats infected with leprosy-like disease of rats, and likewise in white rats experimentally infected by subcutaneous inoculation. 2. Normal white rats in prolonged direct or indirect contact with infected rats harboured acid-fast bacteria in the nose and developed the disease under the conditions of the experiments. 3. Rat leprosy has developed in white rats subsequent to the instillation of a suspension of rat lepromata into the nostril without trauma to the nasal mucous membrane. L. R.

MARCHOUX (E.), CHORINE (V.) & KOECHLIN (D.). Infection lépreuse des rats par la voie oculaire. [**Lepra Infection of Rats via the Conjunctiva.**—*Ann. Inst. Pasteur.* 1935. Dec. Vol. 55. No. 6. pp. 632–640. With 3 coloured figs. on 1 plate. [11 refs.]

In view of the frequency of nasal involvement in human leprosy, possibly through infection *via* the lachrymal duct, and of the demonstration by CALMETTE that laboratory animals can be infected through the conjunctiva with the acid-fast bacillus of tubercle, the authors have applied emulsions of rat lepromata to the conjunctiva of healthy rats and traced the penetration of the causative bacilli through the mucous membrane by diapedesis of leucocytes that have engulfed them. On killing the rats after 12 to 16 months no visible external leprous lesions were noted, but on careful microscopical examination it was found that, although the eye itself was not involved, the leprous organisms were found in the lymphoid tissue at the internal angle of the eyelids and in the lymphatic glands of the neck and even in those of the axilla. It therefore appears to be likely that in human leprosy any bacilli that may be deposited on the conjunctiva by a contaminated finger may gain access to the local lymphatics, but infection of the eye itself is not the result of a local infection; it is part of a generalization of the disease. L. R.

LAMPE (P. H. J.) & DE MOOR (C. E.). Ratten-lepra. [**Rat Leprosy.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1935. Nov. 26. Vol. 75. No. 24. pp. 2033–2049. With 8 figs. on 2 plates. English summary.

Attempts at the experimental infection of 56 young white rats, either by percutaneous inunction of the skin of the belly after shaving

so as to cause slight bleeding, or by subcutaneous injection into the root of the tail of lymph node emulsions from naturally infected leprosy rats in Batavia are recorded, some of the animals being fed on a vitamin deficient diet, the animals being kept under observation for 1½ years. In rather over 90 per cent. infection occurred by either method, usually within four to ten months, with the occurrence of enormous number of the bacilli in the skin lesions, mostly intracellular. Lepromata resembling those of cutaneous leprosy in man not infrequently occurred at the site of inunction, and glandular involvement and ulceration might follow. Vitamin B₂ deficiency had some influence in aiding the development of the disease after percutaneous inunction with moderate doses. The virus appeared to behave more like a saprophyte than a parasite.

L. R.

TIHON (L.) Contribution à l'étude des huiles chaulmoogriques indigènes du Congo Belge. [**Chaulmoogra Oils in Tree Indigenous to the Belgian Congo.**]*—Bull. Agric. Congo Belge.* 1935. Sept. Vol. 26. No. 3. pp. 315-321.

The various trees in different countries that yield oils containing chaulmoogric and hydnocarpic fatty acids belong to the family of Flacourtiaceae. The author has studied those of the Belgian Congo and West Africa, namely *Oncoba glauca* or *Caloncoba glauca* and *Caloncoba Welwitschii*, and he gives analyses of *Caloncoba glauca*. This he states is superior to the others in richness in fatty acids possessing rotatory powers, the percentage amounting to 31.47 of the seeds. The fatty acids have a density at 26°C. of 0.940, a refractive index at 40°C. of 1.4765, an acid index of 3.25, a saponification index of 190, an ether index of 186.34, an iodine index of 98.10, a deviation of the polarimeter at 20°C. of 46.08 and a specific rotatory power of 49.02. The melting point is 54° to 56°C., the index of neutralization 204, and the mean molecular weight 275. He therefore concludes that this oil is a very promising one in the treatment of leprosy.

L. R.

DE MELLO (F.) & LOYOLA PEREIRA (O.). Les injections intraveineuses d'huile de chaulmoogra. [**Intravenous Chaulmoogra Oil in Leprosy.**]*—Bull. Soc. Path. Exot.* 1935. Oct. 9. Vol. 28. No. 8. pp. 700-701.

This very brief note records that 45 leprosy cases have been treated by about 1,000 intravenous injections of chaulmoogra oil by the method of Labernadie without accident except in one complicated by pulmonary tuberculosis. He thinks this plan more efficacious than other forms of administration.

L. R.

HUECK (Otto). Ueber Lepra-Behandlung in der Canton-Provinz. [**The Treatment of Leprosy in Canton.**]*—Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Nov. Vol. 39. No. 11. pp. 464-474.

The author reports the use of alepol and ester chaulmoogrates in leprosy cases in Canton with somewhat variable results. More physicians are required to tackle the problem effectively in that very leprous region.

L. R.

MONTEL (M. L. R.) & TRUONG-VAN-QUE. Un cas de lèpre généralisée (forme mixte) associée au paludisme et traitée uniquement par le bleu de méthylène combiné au rouge neutre de toluène en solution à 1/100. Observation et bilan après 7 mois 10 jours de traitement.—*Bull. Soc. Méd.-Chirurg. Indochine*. 1935. Feb.-Mar. Vol. 13. No. 2. pp. 58-71. With 2 figs.

— & —. Un cas de lèpre généralisée (forme mixte cutanéonerveuse et tuberculo-maculeuse) traité par le rouge neutre associé au bleu de méthylène. Observations et bilan après cinq mois de traitement. [**Cases of Mixed Leprosy treated with Methylene Blue and Neutral Red.**].—*Ibid.* pp. 72-78.

The first of these cases was a bacteriologically positive dermal one in which, after seven months' treatment with 25 injections in two series, containing a total of 5.55 gm. of methylene blue, and eight containing a total of 0.58 gm. of neutral red, lesions in the testicles cleared up with return of the sexual functions, as well as those of the skin, but as lepra bacilli could still be found in the dermis the treatment will be continued with the addition of chaulmoogra preparations.

The second case was originally negative bacteriologically but the dermal lesions completely disappeared under the same treatment.

L. R.

i. TRUONG-VAN-QUE. Un cas d'infantilisme lépreux traité par la méthode de M. L. R. Montel. (Bleu de méthylène intraveineux.) Observation et bilan après cinq mois et onze jours de traitement. [**The Treatment of Leprosy by Dyes.**].—*Bull. Soc. Méd.-Chirurg. Indochine*. 1935. Apr. Vol. 13. No. 3. pp. 247-256. With 2 figs.

ii. MONTEL (M. L. R.), LE-VAN-PHUNG, NGUYEN-VAN-KHAI, TRAN-VAN-HANH, DO-VAN-HOANH, TRUONG-VAN-QUE & NGUYEN-NGOC-NHUAN. Observations résumées de vingt cas de lèpre chez des jeunes. Traitement par le bleu de méthylène seul ou associé au chaulmoogra.—*Ibid.* May. No. 4. pp. 337-361. [24 refs.]

iii. DE RAYMOND. Le traitement de la lèpre au Tonkin par les colorants.—*Ibid.* pp. 440-441.

DE FAJOLE. Note thérapeutique sur le traitement de la lèpre par les colorants.—*Ibid.* p. 442.

iv. VU-NGOC-ANH. Traitement de la lèpre par le bleu de méthylène et l'éosine à la léproserie de Vân-môn.—*Ibid.* pp. 443-451.

v. DOROLLE (P.) & NGO-QUANG-LY. Résultats obtenus après quatorze mois d'expérience du traitement de la lèpre par les colorants. (Bleu de méthylène et eosine-bleu).—*Ibid.* July-Aug. No. 6. pp. 675-706.

vi. FRÉVILLE (L. H.). Le traitement de la lèpre par la méthode de M. L. R. Montel. (Résultats après un an d'expérimentation).—*Ibid.* pp. 707-718. [10 refs.]

vii. DUBOIS (A.). A propos du traitement de la lèpre au bleu de méthylène.—*Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 550-551.

viii. MONTEL (R.). La chromothérapie de la lèpre. Etude générale.—*Ibid.* pp. 616-626. [43 refs.]

ix. —. A propos de la communication de Mme. E. Delanoë "le bleu de méthylène compris dans le traitement mixte de la lèpre"

et de la discussion de cette communication.—*Ibid.* Oct. 9. No. 8. pp. 695-696.

- x. — & TRAN-VAN-HANH. Un cas de lèpre cutanée tuberculeuse généralisée récente traité par le bleu de méthylène. Blanchiment clinique et bactériologique.—*Ibid.* pp. 696-700.

i. This note records a case of leprosy in a girl of twenty, with infantile development, who improved greatly in her symptoms and development under methylene blue treatment for three months.

ii. Brief notes are given of twenty cases in children and adolescents treated by a combination of methylene blue intravenously and injections of chaulmoogra preparations. All the cases showed improvement, and in half the clinical symptoms were cleared up. In three-fourths the discharge of lepra bacilli from the nose ceased, and in half the organisms could no longer be found on microscopical examination of the lesions. In three cases relapse took place after one to six months, and in three pustules occurred in the course of treatment followed by improvement. In all the cases the size of the nerves was reduced.

iii. The very brief note by Raymond records that 99 patients had been treated since June 1934 with intravenous injections of methylene blue and other dyes, including eosin, fluoresceine and fuchsin, with unsatisfactory results, as apart from some temporary remission of symptoms, no clear manifestations of any curative action were observed. On giving up the use of the dyes and using hyposulphite of magnesium and chaulmoogra preparations more favourable local and general improvement was obtained.

Fajole also reports that methylene blue was without any specific effect.

iv. This paper reports on fifteen cases treated with 1 to 2 per cent. solutions of methylene blue and of eosin intravenously. Two of them showed definite benefit, and six more showed slight improvement. On the other hand in three cases the activity of the disease appeared to be increased even when temporary improvement had at first been noticed. There was no difference between the two dyes for with both improvement in the appetite and in the healing of ulcers was only momentary in all but two cases. This was not due to deficiency of dosage as Montel's method was strictly followed.

v. Fourteen months' experience of the dye treatment is recorded in this paper with short notes of 30 cases, including 1,313 intravenous injections, about half having been of methylene blue, without any ill results. For this purpose they use the following formulas of Peirier. A solution of 1 per cent. methylene blue RAL, neutralized (pH 7.4) and isotonic, filtered and sterilized by Tyndall's method. A solution of 2 per cent. eosin-blue (1.50 eosin RAL, 0.50 methylene blue RAL neutralized (pH 7.35), isotonic, filtered and sterilized by Tyndall's method. Of 55 lepers treated 17 did not continue the treatment sufficiently long, less than 18 injections, and 8 recent cases are also excluded from consideration for various reasons. They found no difference in the value of the two solutions, but prefer 2 per cent. eosin-blue, of which they injected totals of from about 500 to over 1,000 cc. in the course of 2 to 13 months. In 23 cases improvement was noted with complete clearing up of the lesions in 7, slight improvement in 9, moderate in 7, and very marked in 7. Nodules, ulcers and infiltrations were nearly always improved, but erythematous, tuberculoid and macular lesions were less influenced. Pains

and sleeplessness were relieved, as well as thickening of nerves and muscular atrophies causing deformities of the hands. Pustules, with elimination of the lepra bacilli, and reactions in the nerves were followed by benefit. On the other hand, very little action on the lepra bacilli was observed, for in only 2 of 18 cases did they disappear from the nose, and in no case from the cutaneous lesions. They advise combining the use of the slower action of chaulmoogra preparations with the more active action of the dyes.

vi. This author also advocates the combined use of Mercado's chaulmoogra formula with the dye treatment and he reports on 10 months' experience with very similar results to the above, but he remarks that it is too soon to speak of cures.

vii. The author reports the unsuccessful prolonged use of the dye treatment in full doses.

viii. In this note Montel summarizes the results he has obtained from the use of various dyes in leprosy. He commences by emphasizing that they do not replace the established value of chaulmoogra preparations as the basis of the treatment of the disease. Trypan blue he soon gave up on account of its injurious effects in producing albuminuria. Brilliant green he found to exert little beneficial action. Neutral red is also badly borne and causes fever, vomiting and toxic symptoms, but in doses not exceeding 10 to 12 cc. and beginning with only 2 to 3 cc. increased by 1 cc. at a time, it provokes reactivation of the lesions and renders methylene blue more effective. On the other hand, methylene blue can be continued for long without any harm, and it clearly reinforces the action of chaulmoogra treatment when given as described in previous papers. The methylene blue is more active than chaulmoogra, but the latter has a more lasting effect and protects more usually from relapses. The association of eosin and methylene blue as given by G. RYRIE is comparable with the latter alone. Fluoresceine-Uranine and resorcinol are also of value.

ix. In this brief note Montel criticizes DELANOE's unfavourable report on methylene blue treatment on the grounds of insufficient treatment and of his omission to use chaulmoogra treatment as well.

x. This is a report of a case of generalized cutaneous leprosy completely cleared up, with disappearance of the lepra bacilli from the lesions and improvement in the nerve symptoms under methylene blue treatment.

L. R.

FERNANDEZ (José M. M.) & SCHUJMAN (Salomon). Nuestra experiencia acerca del valor de algunas anilinas en el tratamiento de la lepra. [Experiences with Aniline Dyes in the Treatment of Leprosy.]—*Rev. Leprologia de São Paulo*. 1935. Sept. Vol. 2. No. 3. pp. 157-168. [10 refs.]

The authors tested the following:—

1. *Trypan blue*. A 4 per cent. solution, filtered, sterilized and kept away from light, was used for 7 patients in an advanced stage of leprosy. Five cc. given intravenously was well tolerated by all; 4 days later 10 cc. of a fresh solution prepared 12 hours before were injected. All the patients felt ill, and complained of precordial and epigastric pain, nausea and shivering, but with one exception all recovered in 15 minutes. This patient who showed an intense leprosy reaction passed almost at once into a state of coma and died in 5 minutes. No further trials were made with this preparation.

2. *Fluorescein*, a 2 per cent. solution in 2 per cent. bicarbonate of sodium solution, injected twice a week, starting with 5 cc., then 10 cc. and going gradually to 20 cc. without giving rise to any signs of intolerance. Thirty-two patients, mostly in an advanced stage, were thus treated, 29 had previously had chaulmoogra. Three patients with acute iritis seemed to benefit but no effect was observed in any of the others.

3. *Bonney's blue*, which is a mixture of brilliant green and crystal violet, of a strength of 0.5 gm. of each in 2½ litres. Fourteen were thus treated, starting with 3 cc. intramuscularly; this, however, caused abscesses and intradermal infiltration of 4 cc. was given twice a week, and a month later this was combined with intravenous injection of 10 cc. After 20 weeks' treatment, 2 had made a little improvement, 4 were worse and 8 remained stationary. All but one had previously received treatment with chaulmoogra.

4. *Eosin*, 2 per cent. solution injected intravenously twice a week in doses of 10 cc. was tried in 7 patients with the leprous reaction, but no improvement was observed in any of them.

5. *Methylene blue*, 1 per cent. aqueous solution injected intravenously in doses starting at 5 cc. and increasing to 20 cc., injection being given every 3 days. Fourteen patients were thus treated. No beneficial effect was observed regarding the general condition, or clinical or bacteriological manifestations. On the leprous reaction in four cases the condition became frankly worse, in three others there was no change.

In brief, these aniline dyes were inferior in action to chaulmoogra and its derivatives.

H. H. S.

MONTEL (M. L. R.). A propos de trois communications sur le traitement de la lèpre par le bleu de méthylène (ce bulletin No. 4 mai 1935. T. XIII—P. 440 à 451).—*Bull. Soc. Méd.-Chirurg. Indochine*. 1935. Sept. Vol. 26. No. 7. pp. 793-797. (Discussion par le Docteur DOROLLE pp. 797-798).

NGUYEN-VAN-TUNG. A propos du traitement de la lèpre par le bleu de méthylène.—*Ibid.* pp. 799-805.

BORZONE (A.). El azul y el rojo de metileno, en el tratamiento ecléctico de leprosos.—*Rev. Méd. Peruana*. 1935. Nov. Vol. 7. No. 83. pp. 875-878.

SORLEY (J. T.). **The Use of Brilliant Green intravenously in the Treatment of Leprosy.**—*West African Med. J.* 1934. Oct. Vol. 8. No. 2. pp. 13-14.

A trial of 1 per cent. brilliant green intravenously in the small doses of 3 to 5 cc. twice a week produced albuminuria and jaundice in some cases, but considerable clinical improvement was noted in cases previously on alepol.

L. R.

BRAGA (Renato). Tratamento da lepra pelo azul de methyleno. [**Treatment of Leprosy by Methylene Blue.**]—*Rev. Leprologia de São Paulo*. 1935. Num. especial. pp. 7-32.

An interesting paper giving details of 63 patients with different forms of leprosy and stages and combinations of them treated with injections of 1 per cent. methylene blue in distilled water. The opinion

gained from these is temperately expressed. Injections were given intravenously in increasing doses at 3-4 day intervals. Many of the patients were in an advanced stage; some were quite intolerant of chaulmoogra and its derivatives, but after a course of the dye were enabled to take the specific drug. It may be that the methylene blue serves as a vector for other antilepra remedies (MONTÉL recommends it being given with chaulmoogra), bringing about a state which leads to a better or more intense action of these others. At all events, whatever be its mode of action, the author maintains that though he has not used the dye in sufficient cases to venture an opinion on its merits in general, nevertheless the good effects observed in some of them warrant further trial.

H. H. S.

MAURANO (Flavio). Os resultados do tratamento pelo azul de metileno endovenoso. Segundo a technica de Montel sob o ponto de vista dermatologico. [**Methylene Blue Intravenously in Leprosy.**—*Rev. Leprologia de São Paulo*. 1935. Num. especial. pp. 33-37.]

Dr. Maurano expresses an opinion markedly at variance with the above. He is particularly concerned with the skin lesions due to or associated with leprosy. Forty-four patients in all stages of the disease were given injections of methylene according to Montel's technique; he concluded that only one improved, while in seven the general state was worse and in another 11 the skin lesions were aggravated. In the author's view, not only is it "without efficacy, but is even harmful. In 25 per cent. of the patients, the skin lesions were worse after its use, and in 18 per cent. the general condition was aggravated; all the rest, with one exception, were unaffected."

Twenty-six of the 44 presented the leprous reaction; only one patient benefited from the methylene blue; five showed an increase, in four it was reduced.

H. H. S.

DE CARVALHO (J. Correa). Tratamento da lepra pelo azul de metileno no asylo-colonia Aymorés. [**Methylene Blue in Leprosy. Results at the Aymorés Leper Colony.**—*Rev. Leprologia de São Paulo*. 1935. Num. especial. pp. 38-43.]

Notes are given of 16 cases, one nodular, the rest mixed, treated by Montel's method. Of these, 4 were worse, 3 slightly improved and 9 showed distinct amelioration. The author gives a summary, without individual details, of 51 cases, 43 with mixed, 8 with the nervous form of the disease. The results varied considerably; in 14 he noticed retrogression of lepromata, but in three it seemed to provoke ulceration. He concludes that it merits use as an adjuvant.

H. H. S.

VALENTE (Edison Costa) & BECHELLI (Luiz Marino). O azul de metileno no tratamento das reacções leprosas. [**Methylene Blue in Treatment of the Leprous Reaction.**—*Rev. Leprologia de São Paulo*. 1935. Num. especial. pp. 44-53.]

Thirty-seven patients, 13 with the nodular form and 24 with mixed leprosy, received the methylene blue treatment for the leprous reaction. Note is given of each, but the results may be summed up by saying that 6 were cured, 5 much relieved, 2 slightly improved, 9 were worse and the remaining 15 were not affected. The doses given were small

(to 20 cc.), average (20–25 cc.) and high (more than 25 cc.). Of those cured 3 had high, 2 average, and 1 small doses; of those much improved 3, 1 and 1 respectively; of those made worse 4 had large, 1 average and 4 small doses. In short, administration of the dye was followed by marked benefit in 11 and some benefit in 13 of the 37 cases, and generally better results were obtained from the use of doses exceeding 25 cc. H. H. S.

BECHELLI (Luiz Marino). O azul de metileno no tratamento das algias leprosas. [**Methylene Blue in the Neuralgias of Leprosy.**]—*Rev. Leprologia de São Paulo*. 1935. Num. especial. pp. 54–67.

Fifteen patients with mixed leprosy and suffering from neuralgic pains were treated by injections of methylene blue. The author speaks of the results in terms of high praise. In one only did it fail to give relief. In eight the smaller doses sufficed, six had the large doses; intermediate doses did some good to four of the latter, but the larger doses gave greater benefit. Some exhibited untoward symptoms such as vertigo, pytalism, shivering attacks; in six it seemed to precipitate the leprous reaction, but in four the eruption was vastly improved after the injections. H. H. S.

ARANTES (Francisco Ribeiro). Acidentes observados no tratamento da lepra pelo azul de metileno. (Método de Montel.) [**Ill-Effects observed in Lepers treated by Montel's Methylene Blue Method.**]—*Rev. Leprologia de São Paulo*. 1935. Num. especial. pp. 68–74.

The author's opinion is based on a comparatively small number of cases (50). He found that methylene blue injections had an ameliorating effect on the acute febrile attacks, but only transiently. It proved beneficial in about half his patients suffering from pain, neuralgic or neuritic, not only relieving the pain but giving longer periods of freedom. On the other hand it may precipitate a leprous reaction in patients hitherto free from this. The drug is not harmless, is not well eliminated and may set up a toxic hepatitis associated with diarrhoea, and "it may prove fatal by causing atrophy of the liver"; two patients died. The author concludes, therefore, that "methylene blue in the doses recommended by Montel is toxic and fraught with danger." H. H. S.

JUNIOR (João de Moraes). Tratamento das algias em doentes de lepra. [**Treatment of Pains in Leprosy.**]—*Rev. Leprologia de São Paulo*. 1935. Num. especial. pp. 75–90.

The author has treated 30 lepers suffering from the mixed form with pain in nerves and joints by means of *Crotalus anavenin*. Seven of these had had various other methods of treatment without obtaining relief and of these detailed notes are given. The usual procedure was to wait for 8 days after the last form of treatment and then begin with the anavenin, injecting subcutaneously daily in or near the painful region. In one patient with the pain very persistent two injections were given in a day. In 14 of the total 30 the results were recorded as excellent, another 14 were considerably relieved, and there were only two failures. The dose was 0.1 mgm. and in many the pain disappeared after 6–8 injections, but usually a course of 8–10 was

given. The relief seems to have been prolonged; when seen 1-3 months afterwards the patients were still free. Others who had a slight return received further injections with benefit. *H. H. S.*

NOCHT (Bernard) & VELASCO (Felix). **Some Experiences in the Treatment of Leprosy by Artificially Induced Fevers: Preliminary Report.**—*Jl. Philippine Islands Med. Assoc.* 1935. Nov. Vol. 15. No. 11. pp. 602-609.

The authors were led to try the drugs now being used to produce fever in the treatment of G.P.I. by reports of improvement after attacks of kala azar, smallpox and protein shock. Pyrifer, sulfosin and anaesthesulf have been used, but only the first to any material extent because the patients refused to continue with sulfosin on account of the severe pains it induced, and this was also a drawback with anaesthesulf beginning some hours after the injection, in addition to which bronchial irritation was sometimes caused by both of them. Pyrifer was, however, given to six cases, in three or four series of 10 injections each, without after ill-effects, except chills and headache, and the high fever of from eight to ten hours up to 104°F. was well borne. Leucocytosis and prolongation of the sedimentation time were observed during the fever. Only one patient showed any marked improvement, and he differed from the rest in showing very strong febrile reactions after small doses from the first. Further trials are being made. Pyrifer is a sterilized suspension of a non-pathogenic bacillus of the *coli* group in 7 different strengths containing from 50 to 5,000 units, by means of which graduated febrile reactions can be obtained. *L. R.*

BASU (N. K.). Diets in Relation to Diseases with Special Reference to Tuberculosis and Leprosy.—*Jl. Indian Med. Assoc.* 1935. Oct. Vol. 5. No. 1. pp. 8-9.

ATHAVALA (V. B.). Myiasis and Leprosy.—*Jl. Indian Med. Assoc.* 1935. Oct. Vol. 5. No. 1. pp. 10-12.

DE ABREU (Manoel). Tratamento anti-leprótico em Santo Angelo e seus resultados.—*Rev. Leprologia de São Paulo.* 1935. Num. especial. pp. 115-151.

LIMA (Lauro de Souza). Metodo de infiltração intradérmica ou "plancha." —*Rev. Leprologia de São Paulo.* 1935. Num. especial. pp. 167-173.

HUIZENGA (Lee S.). Human Sterilization and its Application in Leprosy.—*Jl. Philippine Islands Med. Assoc.* 1934. Dec. Vol. 14. No. 12. pp. 469-476.

RABIES.

A REVIEW OF RECENT ARTICLES. XXIV.*

i. *Virus.*

In a paper published in 1932, REPETTO (this *Bulletin*, 1933, Vol. 30, p. 141) drew attention to the existence of foci of rabies in the lower Congo. These were at Kasai, at Coquilhatville, at Kivu, at Kwango and in the Bas-Uélé. The symptoms were of the *oulou-fato* type. MATTLET¹ has discovered another focus at the Urundi. It has been periodically discovered in this locality, and "one can conclude that the Urundi constitutes a permanent focus of the *oulou-fato* type of rabies."

A report on rabies in cattle and horses in Santa Catharina (Brazil) is presented by de Freitas LIMA.² This subject has frequently been referred to in these reviews, in particular in summarizing the work of de Queiroz LIMA (this *Bulletin*, 1934, Vol. 31, p. 637) of TORRES (1932, Vol. 29, p. 596) and of HURST and PAWAN (1932, Vol. 29, p. 595). The author of the present article contributes no new facts, and is guarded as to the mode of transmission of the epizootic in nature.

REMLINGER and BAILLY³ in an article commemorating the 50th anniversary of the application of Pasteurian treatment to man, describe the procedure to be adopted in examining a strain of fixed virus. This includes the study of the symptoms in the rabbit, the behaviour of the virus to desiccation, to glycerine, to dilution, to ether and to antiseptics, and finally the determination of its immunizing power. They stress the fact that neither the virus of Bucarest in its 2,582nd passage, nor the virus of Tangier in its 1,550th passage shows any indication of having lost immunizing power.

The comparative efficiency of immersion in glycerine and of freezing for the preservation of virulence has been examined by LÉPINE.⁴ He points out that the usual practice of preserving in glycerine has the recognized disadvantage that that substance is a mild antiseptic. He has shown that undried medulla gradually loses virulence when kept in 30 per cent. glycerine at 0°C., until between the 14th and the 30th day it has completely disappeared, whilst the virulence of frozen medullae remained intact up to the 70th day.

It is well known (HARVEY and McKENDRICK, Scientific Memoirs, Govt. of India No. 30, 1907) that when cords dried over various periods are tested for infectivity, the most marked effect is a reduction in the percentage infected. There may be some delay in incubation

* For the twenty-third of this series see 1935, Vol. 32, p. 605.

¹ MATTLET (G.). Contribution à l'étude de la répartition des foyers de rage canine au Congo Belge.—*Ann. Soc. Belge de Méd. Trop.* 1935. June 30. Vol. 15. No. 2. pp. 221-223.

² LIMA (C. de Freitas). A raiva em Santa Catharina.—*Rev. Depart. Nac. da Produção Animal.* Rio de Janeiro. 1935. Vol. 1. Nos. 5 & 6. pp. 41-59. With 9 figs. [28 refs.] English summary.

³ REMLINGER (P.) & BAILLY (J.). Comment procéder à l'expertise d'un virus rabique fixe?—*Bull. Inst. Pasteur.* 1935. July 15. Vol. 33. No. 13. pp. 609-617.

⁴ LÉPINE (Pierre). Action comparée de l'immersion en glycérine et de la congélation sur la conservation de la virulence des moelles rabiques.—*C. R. Acad. Sci.* 1935. July 8. Vol. 201. No. 2. pp. 172-174.

but this is not so obvious. This was ascribed by the above authors to the centripetal effects of the drying of the cord from without inwards. LÉPINE and CRUVEILHIER⁵ ascribe the phenomenon to the loss by desiccation of the virus of its faculty to travel along nerves (neuroprobiasis). They state that if a heavy emulsion of a fresh cord is inoculated into a cut sciatic nerve, infection takes place 8 out of 9 times, whereas if the emulsion is one of a cord dried even for 24 hours infection never follows (24 guineapigs inoculated). [This observation clearly requires to be confirmed.]

It will be remembered that NICOLAU and KOPCIEWSKA succeeded in retransforming fixed virus into street virus by subpassage by way of the sciatic nerve (this *Bulletin*, 1934, Vol. 31, p. 637 and 1935, Vol. 32, p. 605). KOPCIEWSKA⁶ now investigates the behaviour of the retransformed fixed virus when inoculated into the dog. He finds that Negri bodies are present in large numbers (up to 98 bodies per 100 neurones). Intense negrigenesis and "septinévrite" are the attributes which characterize the retransformed virus.

FUNAYAMA⁷ reports an ingenious experiment in which the filtrability of the virus of rabies is tested *within* the animal body. Small filters (either porcelain bougies or celloidin sacs) containing virus emulsion are introduced into the lateral ventricles of rabbits and left *in situ*. The test was of course whether the rabbit developed hydrophobia. Using Chamberland I₁ bougies 2 out of 13 were infected, with L₃, 3 out of 19, with L₉, 4 out of 21. With celloidin sacs 30 out of 54 were infected. Various strains of fixed and street virus were used but there seemed to be no difference in their filtrability.

A thorough and painstaking though fruitless research has been carried out by WALDHECKER.⁸ He has tried by various methods to cultivate the rabies virus and has not succeeded. He has tried to cultivate it in symbiosis with 10 different yeasts, with 2 strains of *Staph. albus*, and with the same organisms on egg medium. He has tried cultivation on the chorion-allantois of the hen embryo, in cultures with embryonic tissue, anaerobically in conjunction with mouse carcinoma, on a Chinese egg medium, and *in vivo* in a growing mouse carcinoma. The results have all been negative.

On the other hand ISABOLINSKI, LEWZOW and TSCHERNJAK⁹ claim to have cultivated the virus in symbiosis with yeasts. To a 10 cc. tube of bouillon to which a loopful of yeast culture has been added, 0.1 cc. of a 1 in 20 emulsion of the brain of a rabbit which died of

⁵ LÉPINE (P.) & CRUVEILHIER (L.). Action de la dessiccation sur la neuroprobiasis du virus rabique.—*C. R. Soc. Biol.* 1935. Vol. 119. No. 27. pp. 1338–1340.

⁶ KOPCIEWSKA (L.). Sur le virus rabique fixe pastorien "ramené en arrière" (transformé apparemment en virus des rues après passages répétés dans le système nerveux périphérique du lapin).—*C. R. Soc. Biol.* 1935. Vol. 199. No. 19. pp. 405–408. With 1 fig.

⁷ FUNAYAMA (Junichi). Experimental Studies on Rabies. II. A Test of the Filtration of the Hydrophobic Virus in Animal Bodies.—*Oriental J. Dis. Infants.* 1935. May. Vol. 17. No. 3. [In Japanese. English summary pp. 21–24. With 5 figs. (2 on 1 plate).]

⁸ WALDHECKER (Max). Versuche zur Züchtung des Lyssavirus.—*Zent. f. Bakt.* I. Abt. Orig. 1935. Nov. 15. Vol. 135. No. 4/5. pp. 259–262.

⁹ ISABOLINSKI (M.), LEWZOW (I.) & TSCHERNJAK (I.). Ueber die Züchtung des Pocken und des Lyssavirus auf Hefenährboden.—*Giorn. di Batteriol. e Immunol.* 1935. Jan. Vol. 14. No. 1. pp. 111–116. English summary (5 lines).

rabies is introduced. This is incubated at 37°C. for 3 days, and then reinoculated in the same proportions into another yeast bouillon tube. As controls, similar passages are made into tubes to which yeast has not been added. Rabbits are inoculated from time to time with 0.2 cc. intradurally. The yeast mixtures were infective up to the 11th generation, whilst the controls were non-infective. It was also found possible to use yeast agar in place of yeast bouillon.

An experiment of a curious nature has been carried out by Bozzelli.¹⁰ A mixture of equal parts of fixed virus and street virus was inoculated into groups of guineapigs, rabbits, and dogs, in four different positions, *viz.*: subdural, anterior chamber of eye, muscles of neck, and intramuscularly into a limb. In each group there were five animals, and two controls, one for street virus alone, and the other for fixed virus alone. The virus which caused death was determined in each case, from the incubation period, and by its behaviour on subpassage. The results may be summarized as follows:—

			Fixed Virus	Street Virus
Subdural :—	Guineapigs ...	...	5	0
	Rabbits ...	...	4	1
	Dogs ...	...	3	2
Ant. Chamber :—	G.P. ...	...	5	0
	Rabbits ...	...	5	0
	Dogs ...	...	1	4
Muscles of Neck :—	G.P. ...	...	3	2
	Rabbits ...	...	2	2
	Dogs ...	...	1	(1 escape) 4
Muscles of Limb :—	G.P. ...	...	0	5
	Rabbits ...	...	0	4
	Dogs ...	...	0	(1 escape) 4 (1 escape)

The two controls for the first 3 positions gave satisfactory incubations. In the case of those inoculated into the muscles of the limb the fixed virus control in guineapigs had an incubation period of 22 days, whilst in rabbits and in dogs it failed to infect: the incubations with street virus were 12, 13, and 14 days respectively.

The net results of this experiment would appear to be that fixed virus, as was to be expected, was the "winner" where the mixture was inoculated into nervous tissue directly, and gave place to street virus when inoculation was into muscles: and that the guineapig was the most susceptible to fixed virus, the rabbit rather less, and the dog the least susceptible.

That certain strains of fixed virus, such as the Tunis strain, have the potentiality in undue degree of producing Negri bodies is shown by LEVADITI and SCHOEN.¹¹ Three strains of fixed virus were com-

¹⁰ BOZZELLI (Roberto). Studio comparativo sul comportamento della cavia, del coniglio e del cane, trattati con inoculazioni simultanee di virus rabbico fisso e di strada. Ricerche sperimentali.—*Giorn. di Batteriol. e. Immunol.* 1935. Feb. Vol. 14. No. 2. pp. 281–304. [47 refs.] English summary (9 lines).

¹¹ LEVADITI (C.) & SCHOEN (R.). Le potentiel negrigène des virus rabiques fixes.—*C. R. Soc. Biol.* 1935. Vol. 119. No. 23. pp. 811–815. With 2 figs.

pared. In the Paris strain the bodies were very small, and few showed inner structure; they were absent in the dog and excessively rare in the rabbit and mouse. In the Tangier strain, the bodies were rare, sometimes had inner structure, were found in the horn of Ammon of the dog, were absent in the rabbit, and were very rare in the mouse. In the case of the Tunis strain bodies were found in the rabbit in the horn of Ammon though in reduced numbers. They were absent in the dog, but frequent in the mouse.

LEVADITI and SCHOEN¹² have further investigated the oxyphil corpuscles analogous to Negri bodies which are found in the cytoplasm of the corneal epithelium, in animals inoculated with street virus (this *Bulletin*, 1934, Vol. 31, p. 145). It appears that three strains of street virus, Bucarest II, Tangier IV and Tangier III did not behave identically. The strain Bucarest II gave rise to the largest number of Negri bodies in the brain and also in the corneal epithelium. Oxyphil bodies were more numerous in the cornea which had been the focus of infection than in that of the other eye, but on the other hand the virulence of the non-inoculated cornea seemed to be the higher. There appears to be no direct or constant correlation between the concentration of Negri bodies in a cornea, and its virulence.

In a third paper¹³ these authors compare the evolution of the rabies virus with that of the vaccinia virus (Guarnieri bodies) in the cornea epithelium. The main distinction is that whilst the Guarnieri bodies appear only in the cornea which has been infected, in the case of rabies oxyphil corpuscles are often found in the two corneae at the same time. The authors consider that this proves that the vaccine virus remains local, whilst the virus of rabies first invades the central nervous system, and then travels along the 5th nerve to the cornea centrifugally.

In an article of 29 pages SHORT¹⁴ discusses the question of nature of the Negri body. After a résumé of the literature on the subject, he describes fully the appearances which he has observed in tissues stained by Mann's stain and by iron haematoxylin. The material which he has employed is mainly the brain of the dog, and in this he has examined the appearances at all stages of development of the disease. Series of dogs were infected, and individuals were sacrificed at intervals throughout the course of infection. Some correlation was found between number and size of Negri bodies and the duration of clinical symptoms, and it appeared that the salivary glands may be infective before the onset of symptoms. The location, size and shape of the Negri bodies are then described, with numerous illustrations. Their internal structure is then dealt with. In a final discussion the author finds no evidence that the bodies are the products of nuclear or nucleolar degeneration. The theory that they are parasitic protozoa "while it cannot be dismissed, has no indubitable facts to support it."

¹² LEVADITI (C.) & SCHOEN (R.). Les corpuscules oxyphiles cornéens en rapport avec les diverses souches de virus rabique des rues.—*C. R. Soc. Biol.* 1935. Vol. 119. No. 20. pp. 463-466.

¹³ LEVADITI (C.) & SCHOEN (R.). Evolution du virus vaccinal et du virus rabique des rues dans l'épithélium cornéen.—*C. R. Soc. Biol.* 1935. Vol. 119. No. 22. pp. 706-709. With 4 figs.

¹⁴ SHORT (H. E.). Morphological Studies on Rabies. Part II. Negri Bodies in the *Hippocampus major* in Street Virus Infections.—*Indian J. Med. Res.* 1935. Oct. Vol. 23. No. 2. pp. 407-436. With 58 figs. on 3 plates & 1 text fig. [34 refs.]

The theory that the bodies are the cell inclusions of a virus disease remains in the author's judgment unproven. The structure of the bodies is uniform, and "is the same in whatever animal it is studied, and the bodies have all the morphological characteristics of organized entities rather than those of mere agglomerations of elementary bodies such as the orthodox inclusion bodies are presumed to be." As none of the usual theories appears to have been established the author "submits for consideration, that on morphological grounds alone, the possibility should be considered that the Negri body is a vegetable organism structurally most closely approaching the yeasts." The author has kindly furnished us with sections showing the appearances which he describes.

RAMON Y CAJAL and GRACIA (Trabajos del Laborat. de Investig. biol., Vol. 3, 1904) showed that in rabies (both fixed and street) the neurofibrils of the nerve cells are hypertrophied and fuse to form filaments. These observations are confirmed by MANOUÉLIAN,¹⁵ who considers that these appearances are indications of degeneration. The neurofibrils increase and fuse until finally they coalesce into homogeneous masses.

In an article of over 30 pages LOURENS¹⁶ summarizes our knowledge regarding the pseudorabies of AUJESZKY. A report is also included of the discussion on the subject at the 9th session of the "Office international des Epizooties," Paris (1935), at which a resolution affirming the necessity for the collection of further information regarding the disease and for further experimentation on the action of the virus was passed.

It appears that pseudorabies can be communicated by dropping 0.2 cc. of a 1 in 50 emulsion of fresh brain substance from a rabbit dead of the disease into the external ear. The interest of this observation of REMLINGER and BAILLY¹⁷ is that this is an ectodermal route similar to that of the skin.

The mode of transmission of AUJESZKY's pseudorabies has been the subject of much recent discussion. GERLACH and SCHWEINBURG¹⁸ now report that they have observed "a spontaneous transference of the disease from a sick animal to a healthy unwounded animal," that the disease can be communicated by the bite, and that the saliva of a sick cow was infective to rabbits and guineapigs (cf. REMLINGER and BAILLY this *Bulletin*, 1933, Vol. 30, p. 578). The disease is described as it occurs in the dog, cat, horse, in cattle, pigs, rabbits, mice and guineapigs. The differential diagnosis from rabies is difficult. Negri bodies indicate rabies but they are not always found. A clinical diagnosis is, according to the authors, not possible. A second communication will deal with serological reactions and crossed immunity tests.

¹⁵ MANOUÉLIAN (Y.) Altérations massives du réseau neurofibrillaire dans la rage. Dégénérescence neuro-hyaline des cellules nerveuses des ganglions cérébro-spinaux.—*C. R. Soc. Biol.* 1935. Vol. 119. No. 25. pp. 1021-1023. With 4 figs.

¹⁶ LOURENS (L. F. D. E.). Ziekte van Aujeszky.—*Tijdschr. v. Diergeneesk.* 1935. Sept. 1 & 15. Vol. 62. Nos. 17 & 18. pp. 885-902; 949-964. [3 pages of refs.] English summary.

¹⁷ REMLINGER (P.) & BAILLY (J.). Transmission de la maladie d'Aujeszky au lapin par voie auriculaire.—*C. R. Soc. Biol.* 1935. Vol. 119. No. 24. pp. 937-939.

¹⁸ GERLACH (F.) & SCHWEINBURG (F.). Experimentelle Untersuchungen ueber die Aujeszky'sche Krankheit (Pseudowut). I. Mitteilung.—*Wien. Klin. Woch.* 1935. Nov. 8. Vol. 48. No. 45. pp. 1379-1382.

The mode of transmission of pseudorabies in cattle is also discussed by SHOPE.¹⁹ There is no evidence, he says, that the disease is contagious or that ectoparasites play a part in transmitting the causative virus. The morbidity rate in herds does not usually exceed 10 per cent. Experiments with pseudorabies in swine have supplied information suggesting that the disease in this species may be of epidemiological importance in the spread of the infection to cattle. In the pig the disease is relatively mild, but highly contagious. The nose serves both as an entrance and as an exit for the virus. Contact between the abraded skin of rabbits and the nose of infected swine induces infection. In certain cases which SHOPE has examined it is believed that swine which harboured a mild and unrecognized pseudorabies infection transmitted the disease to the cattle with which they were associated, by the transfer of the virus on their noses to the abraded skin of the cattle.

In a second section of this communication SHOPE shows by examination of the blood sera, that the disease is highly prevalent in middle western hogs. Rats may also play a part. When infected they rapidly develop a fatal infection. They may serve as the initial source of infection of a herd of swine and also as one means by which the virus can be spread from farm to farm.

ii. *Symptomatology and Diagnosis.*

IYENGAR²⁰ reports a case in which the incubation period is stated to be 1,180 days. He believes that the possibility of a fresh infection during the interval has been excluded.

An interesting case is described by GENEVRAY and DODERO.²¹ A pregnant woman showing symptoms of rabies was submitted to a Caesarean operation, and died of typical rabies some hours after. The diagnosis of rabies was confirmed histologically and by animal experiment. The child remains well and is 13 months old. It would thus appear that the virus had not traversed the placenta, or if so, in too small quantity to transmit the disease. The serum of the child was tested at the age of 8 months, and no rabicidal substances were demonstrable.

LÉPINE²² recommends for the staining of Negri bodies, a mixture of two solutions: A, 1 gm. basic fuchsin in 200 cc. of 50 per cent. alcohol; B, an aqueous solution of safranin 1 per cent. Paraffin sections after treatment with xylol and alcohol are stained for 10 minutes with equal parts of the above solutions. They are decolourized

¹⁹ SHOPE (Richard E.). Experiments on the Epidemiology of Pseudorabies. I. Mode of Transmission of the Disease in Swine and their Possible Role in its Spread to Cattle. II. Prevalence of the Disease among Middle Western Swine and the Possible Role of Rats in Herd-to-Herd Infections.—*Jl. Experm. Med.* 1935. July 1. Vol. 62 No. 1. pp. 85-99. [15 refs.]; 101-117. [10 refs.]

²⁰ IYENGAR (K. R. K.). A Case of Hydrophobia with the Longest Incubation Period on Record.—*Indian Med. Gaz.* 1935. Oct. Vol. 70. No. 10. p. 562.

²¹ GENEVRAY (J.) & DODERO (J.). Note sur un enfant né d'une mère en état de rage.—*Ann. Inst. Pasteur.* 1935. July. Vol. 55. No. 1. pp. 124-127. [14 refs.]

²² LÉPINE (P.). Méthode de coloration histologique du névraxe pour l'étude cytologique de la rage et des maladies à virus, (inclusions nucléaires et inclusions protoplasmiques).—*C. R. Soc. Biol.* 1935. Vol. 119. No. 23. pp. 804-805.

in alcohol acetone and washed, then coloured for $\frac{1}{2}$ to 1 minute with Stévenel's permanganate blue solution, undiluted (*Bull. Soc. Path. Exot.*, 1918, Vol. 11, p. 870) washed in running water to eliminate excess of blue, again destained in alcohol acetone, then dehydrated in 95 per cent. alcohol: xylol: balsam. The tissues in relation to inclusions in general are coloured as follows: Stroma pale rose, neuroglia and leucocytes violet, neurones blue, chromatin purple, nuclei bright red, nuclear inclusions and oxyphil substances bright rose, Negri bodies rose-mauve, internal structures lilac.

This method of staining has been compared with that of Giemsa by NICOLAU and BAFFET.²³ In a series of four experiments the numbers of Negri bodies found in sections stained by LÉPINE's method were 2.4, 3.6, 4.3, and 5.7 times as great as those found in sections stained by Giemsa.

A rapid method for demonstrating Negri bodies in urgent cases is given by FRYER.²⁴ Small pieces of hippocampus $\frac{1}{8}$ th inch thick in hot (60°C.) formol saline for 15 minutes. Dehydrate in abs. alc. 10 minutes, then in a mixture of acetone and ether (equal parts) for 10 minutes. Clear in cedar wood oil at 60°C. Two changes paraffin wax, 10 minutes in each at 60°C.; embed and cut. Mount on albuminized slides, fix gently over the Bunsen flame. Remove paraffin with xylol, then alc., wash carefully in aq. dest. Pour on equal parts of hot 1 per cent. aqueous methylene blue, and 1 per cent. eosin for about 15 minutes according to thickness of section. Wash with aq. dist., flood section for 10 seconds with formalin (40 per cent.) wash with water. Differentiate with alkaline alcohol (30 cc. abs. alc. with 8 drops of 1 per cent. sod. hyd.) rapid alcohol till blue, clear with xylol and mount. Negri bodies stain red. The whole process can usually be completed in $1\frac{1}{2}$ to 2 hours. Naturally histological detail is not good, but Negri bodies are well defined, and stand out prominently.

iii. Pathology.

The lesions of the neurones in fixed virus rabies have been studied by LÉPINE and SAUTTER.²⁵ (1) Negri bodies are rarely found, and if present are very small and have no inner structure. (2) Nuclear lesions in the form of hyperchromatic corpuscles, round or oval, more or less numerous in the same cell, appear in the interior of a uniformly oxyphil nucleus from which all traces of chromatin have disappeared. (3) Fine intra-protoplasmic inclusions, granular or elongated of the type described by MANOUELIAN are frequently seen. These effects are seen in sections stained by LÉPINE's method.

iv. Methods of Treatment and Statistics.

For the last six years a standard method of antirabic treatment has been employed at the institutes of Yugoslavia. The phenol-ether vaccine of Hempt is used. The results of this experience are the

²³ NICOLAU (S.) & BAFFET (O.). La coloration de lépine dans la recherche des corps de Negri.—*C. R. Soc. Biol.* 1935. Vol. 120. No. 31. pp. 319-322.

²⁴ FRYER (S. V.). A Rapid Method of Diagnosis of Rabies in Urgent Cases.—*West African Med. Jl.* 1934. Oct. Vol. 8. No. 2. pp. 15-16.

²⁵ LÉPINE (P.) & SAUTTER (V.). Sur les lésions spécifiques des neurones dans la rage à virus fixe.—*C. R. Soc. Biol.* 1935. Vol. 119. No. 23. pp. 805-807.

subject of a comprehensive article by NIKOLIĆ,²⁶ superintendent of the institute at Novi-Sad. In the first place the technique of preparation of the vaccine is described, and adequately illustrated. The apparatus for filling capsules in such a manner that both sedimentation and frothing of the emulsion are avoided, is particularly interesting and should be studied by those who are concerned with the distribution of vaccine on a large scale. The second section is statistical. It relates precisely to the same set of statistics as has been classified in my reviews for the League of Nations under the heading "killed ether vaccines," and which have already been referred to in these reviews. The extraordinary immunity of persons bitten on the leg in Yugoslavia (no deaths amongst 8,869 persons bitten), is passed without remark. An interesting series of rabbit experiments in which treatment by Hempt's method is compared with no treatment, yields the following result: Of 346 rabbits which received a preinfectious treatment of 10–25 cc. of vaccine over a period of from 3–4 days, 99 died from intercurrent disease, 19 of rabies, and 228 survived (*i.e.*, percentage of survivors 92.4, and of those dead of rabies 7.6), whereas of 96 controls, 12 died otherwise, 73 of rabies, and 11 survived (*i.e.*, percentages of 13.1 and 86.9 per cent. for survivors and those dead of rabies, respectively). The result of postinfectious treatment was, as was to be expected, not so satisfactory. Of 40 treated from 6–21 days with 1.5 gm. of brain substance, 32 died of rabies (*i.e.*, 80 per cent.), whilst of 14 controls, 2 died of intercurrent disease, and 12 of rabies (*i.e.*, 100 per cent.). The same success was observed in animals treated by dilutions according to the method of Högyes. NIKOLIĆ rightly ascribes the failure of post-infectious immunization experiments to the shortness of the incubation period in experimental rabies.

An interesting set of figures, illustrated by a graph, shows the effect of treatment upon the incubation period in human cases. Of 62 fatal cases treated during the period 1927–1934, 49 (79 per cent.) had incubation periods of under 40 days, and 13 (20.9 per cent.) incubations of over 40 days. Of 53 untreated persons who died during the same period, exact information was available in the case of 28 of them. Of these latter, 4 (14.2 per cent.) incubated in less than 40 days, whilst 24 (85.8 per cent.) had incubations of over 40 days. This result is interesting in relation to VAN STOCKUM's figures (this *Bulletin*, 1935, Vol. 32, pp. 612–616). The author then goes on to discuss 4 cases of post-vaccinal paralysis which occurred amongst the 53,780 persons treated during the six years. The whole question of the causation of accidents is discussed, and the author stresses the possibility of another neurotropic virus being transmitted to the bitten person through the scratch or bite. Finally the question of decentralization of treatment is discussed.

The effect of preinfectious treatment by powerful antirabic sera upon the development of the disease in mice has been studied by HOYT, FISK, and MOORE.²⁷ The sera had a titre of 1/256, and the

²⁶ NIKOLIĆ (Milan). Ueber die resultate der Dezentralisation der Tollwutbekämpfung in Jugoslawien. Auf Grund 6 jähriger Erfahrungen mit der versendbaren phenolisierten Aethervakzine und der abgekürzten Impfmethode nach Hempt.—*Vet. Archiv.* 1935. Vol. 5. Nos. 6 & 7. pp. 247–288; 289–320. With 5 figs. [30 refs.]

²⁷ HOYT (Anson), FISK (Roy T.) & MOORE (Frederick J.). Experimental Rabies in White Mice. Studies on Passive Immunization I.—*Proc. Soc. Experim. Biol. & Med.* 1935. June. Vol. 32. No. 9. pp. 1560–1561.

infecting dose was 0.2 cc. of a filtered emulsion. The sera were injected intraperitoneally from 48 to 1 hour before administration of the test dose. Control mice were given normal serum. It was found that a higher number of treated mice (39 per cent.) survived than of the corresponding controls (12 per cent.). A longer mean incubation period was shown by the treated than by the untreated. The number of mice in the treated group was 155, and in the untreated it was 198. It is stated that the data have been submitted to a careful statistical analysis by Dr. Thurston H. Ross, but no details are given.

The statistics of the Pasteur Institute at Paris for the year 1934 are published by VIALA.²⁸ 496 persons were treated, none developed rabies, and no paralytic sequelae were observed. The strain of fixed virus employed is that which has been in use since 1888. The number of the passage is not given. The mortality during the 33 years up to 1921 ranged from 0.20 to 0.35 per cent. Since 1922 (except for one case in 1924) it has been 0 per cent. It is pointed out that in 1921 the maximum duration of desiccation of cords was reduced from 10 to 5 days, and again in 1935 to 4 days. "Is this a relation of cause and effect? The future will show."

A report on rabies in Cuba is presented by ARENAS MARTORELL and HERRADA LLIBRE.²⁹ The number of human cases is not great, and shows a general decline from 10 in 1925 to 3 in 1933. During the period 1st September 1927 to 15th June 1931, 2,789 animals' brains were examined, of these 484 showed evidence of rabies. Measures of control by immunization of dogs, and by destroying stray animals are in force, and figures are given relating to the various districts.

v. Rabies in Animals.

An interesting report on the prevalence of Rabies in New York City, and on the methods of control is presented by OLESEN.³⁰ The report is a long one and worthy of study; only a few of its most interesting features can be mentioned here. A curve is given showing the number of rabid animals encountered in each year from 1908 to 1934. A period of high mortality (100-250) existed from 1911 to 1915, and a second (100-460) from 1926 to 1930. In the intervals, rabid animals were infrequent (50 and under). There appears to be no correlation between the number of rabid animals and the number of "animal bites," the numbers of the latter have increased more or less steadily throughout. The statistics of these "animal bites" are fully treated, but as these are not apparently related to rabbits they need not be considered here. The author concludes from his data that education of the public is as important as—if not more important than—regulation.

vi. Post-Vaccinal Paralyses.

When during the course of treatment or shortly after it, a person dies from a paralytic accident, and it is found that his brain causes a rabbit to die with the incubation of fixed virus rabies, there can be no

²⁸ VIALA (Jules). Les vaccinations antirabiques à l'Institut Pasteur en 1934.—*Ann. Inst. Pasteur*. 1935. June. Vol. 54. No. 6. pp. 764-769.

²⁹ ARENAS MARTORELL (Rogelio) & HERRADA LLIBRE (Manuel). Estado actual de la rabia en Cuba.—*Rev. Parasit. Clin. y Lab.* Habana. 1935. Sept.-Oct. Vol. 1. No. 1. pp. 22-31. With 1 chart.

³⁰ OLESEN (Robert). Control of Rabies in New York City.—*Public Health Rep.* 1935. Aug. 16. Vol. 50. No. 33. pp. 1087-1106. With 3 figs. [12 refs.]

doubt that the case is one of *rage de laboratoire*. When, however, a person dies with precisely the same symptoms as above, but the animal test fails, is this a case of *rage de laboratoire*? REMLINGER³¹ quotes a number of cases of the first type treated by various methods in which living virus was employed. He points out that the number of cases of *rage de laboratoire* reported is much lower than the actual. In cases which have left the institute and returned home, the practitioner may be able to diagnose a Landry's paralysis, but he rarely proceeds to animal inoculation. Again the virulence may be low and the inoculated animal may escape. The symptoms of *rage de laboratoire* are those of acute myelitis, particularly of ascending type, and of bulbar paralysis. The author describes these in full. He also discusses the experimental diagnosis. Generally speaking the absence of Negri bodies in the horn of Ammon (though not in the oculo-motor nucleus) is indicative of fixed virus rabies, as also is the presence of Babes nodules. It is only exceptionally that there is any difficulty in differentiating post-mortem between street and fixed virus. The author concludes that in general the accidents of antirabic treatment, with the exception of some cases of paralysis after the use of dead vaccines, are largely due to fixed virus, even if they terminate in recovery, or if the result of the inoculation test is negative. This article should be read in full by those concerned with the treatment of rabies.

REMLINGER and BAILLY³² have had occasion to examine a strain of fixed virus from an institute at which paralytic accidents have been observed. It was found to differ in many respects from the classic fixed virus. Comparison was made with the Tangier strain. The virus in question gave exclusively paralytic symptoms, incubated in 5 days in the rabbit, and death followed about the 8th day. In dogs symptoms were exclusively paralytic. No Negri bodies were found in the horn of Ammon nor in the oculomotor nucleus. In these respects the two strains were similar. But as regards desiccation, resistance to glycerine, and to ether considerable differences appeared. The virus under investigation remained invariably virulent up to 17 days, and lost virulence only about the 18th day of desiccation (as compared with about 1 day with the Tangier strain). It remained virulent after 44 days in glycerine (as compared with 8 to 10 days with the Tangier strain). It remained virulent in ether up to 280 hours, whilst the Tangier strain had lost virulence in 215 hours. The virus in question originally emanated from the Pasteur Institute in Paris. How had the change occurred? Whatever be the explanation, the necessity for periodical examination of the fixed virus strains employed at Pasteur Institutes is indicated.

vii. Miscellaneous.

A special number of the *Annales de l'Institut Pasteur*³³ commemorates the 50th anniversary of the first inoculation of man with an antirabic vaccine. The debt that humanity owes to Pasteur is recognized by all, and we would take this opportunity of offering our homage to the great master, who opened a new chapter in the evolution of medicine

³¹ REMLINGER (P.). Le *rage de laboratoire*.—*Bull. Acad. Méd.* 1935. June 11. 99th Year. 3rd Ser. Vol. 113. No. 22. pp. 836-849. [Refs. in footnotes.]

³² REMLINGER (P.) & BAILLY (J.). Virus rabique de passage à propriétés anormales.—*C. R. Soc. Biol.* 1935. Vol. 119. No. 23. pp. 799-801.

³³ ANNALES DE L'INSTITUT PASTEUR. Supplément. Numéro commémoratif sur la rage. Publié le 25 octobre 1935.—228 pp. With numerous illustrations.

by his discoveries regarding immunity and immunization. The volume consists largely of a series of articles on subjects of immediate interest. The first on *rage de laboratoire* covers the same ground as the article by REMLINGER and already reviewed (see above). The second by LEVADITI and SCHOEN is a monograph in which their results regarding corneal inclusions in rabies are collected. In the third chapter MANOUÉLIAN gives a résumé of his views regarding the infectivity of the saliva. NICOLAU and KOPCOWSKA recapitulate their observations on the reconversion of fixed virus into street virus. LÉPINE, CRUVEILHIER and SAUTTER discuss the properties of the Paris strain of fixed virus now in its 1,540th passage. GRYSEZ and MARNEFFE describe similarly the strain (*ex* Paris, 1895) in use at Lille. In a further article REMLINGER and BAILLY collect and discuss information regarding the alterations in the resistance of fixed virus strains to physical and chemical agencies, which occur during the course of sub-passage. PLANTUREUX gives a short paper on prophylactic vaccination of dogs. ROMENSKI describes an investigation in which he found that in experimental rabies the sodium content of the brain diminishes whilst the calcium increases. BOTEZ describes the method of heated vaccines combined with dried cords, employed at Cluj, and gives some statistics. During the years 1928–1932 of 15,958 persons treated 58 (0.36 per cent.) have died of rabies. The results of treatment at Marseilles are given by LIVON. CRUVEILHIER, NICOLAU and KOPCOWSKA show that Pasteurian treatment increases the agglutinins against Eberth's bacillus, and increases the concentration of haemolysins generally. Finally HAGUENAU, CRUVEILHIER and NICOLAU discuss the effects of antirabic treatment upon other diseases. It has no effect on lumbago or vertebral rheumatism; 9 cases of sympathetic pain were unaffected, as also were two of trigeminal neuralgia. On the other hand 6 out of 7 cases of sciatica were completely cured and 1 case of migraine seemed to respond.

The Pasteur Institute at Tunis³⁴ celebrated on the 6th of July, 1935, the 50th anniversary of the first application of antirabic treatment by Louis Pasteur. A message from NICOLLE was read.

An epileptic bitten by a dog was given a course of antirabic treatment by Hempt's method. His epileptic symptoms disappeared and he is now "cheerful, fresh, and able to work." NIKOLIĆ³⁵ was constrained to test his method of treatment in the case of other epileptics. It may be remembered that BARLA-SZABÓ (*Wien. Klin. Woch.* 1935, Vol. 48, p. 81) had used Högyes dilution method for cases of poliomyelitis. The point about Hempt's vaccine is that it contains no living virus. According to NIKOLIĆ it appears that the treatment of epilepsy with killed antirabic vaccines (such as Hempt's) can be used with hope of success in all forms of epilepsy except those which are traumatic or tuberculous. No evidence in favour of this conclusion is cited.

A Summary of Rabies in general is presented by GRAYSON and HASTINGS.³⁶ This is followed by a discussion in which much interesting light is thrown on the conditions under which it prevails in the Southern States of America.

A. G. McKendrick.

³⁴ ARCHIVES DE L'INSTITUT PASTEUR DE TUNIS. 1935. June. Vol. 24. Nos. 3 & 4. pp. 527–528.—Cinquantième anniversaire de la vaccination antirabique.

³⁵ NIKOLIĆ (Milan). Behandlung der Epilepsie mit antirabischen Vakzinen.—*Muench. Med. Woch.* 1935. Sept. 13. Vol. 82. No. 37. pp. 1493–1494.

³⁶ GRAYSON (William B) & HASTINGS (Gordon). The Problem of Rabies.—*Southern Med. J.* 1935. Oct. Vol. 28. No. 10. pp. 924–926. [11 refs.]

REVIEWS AND NOTICES.

LOEPER (Maurice) & collaborators. *Thérapeutique médicale. IX. Maladies infectieuses et parasitaires.* [Medical Treatment. IX. Infective and Parasitic Diseases.]—415 pp. 1935. Paris VIe: Masson et Cie, 120 Boulevard Saint-Germain. [50 fr.]

This work deals almost entirely with essentials and principles; that is, it does not go too much into detail. Such would require a system of treatment in several volumes, part of which at least would soon be out of date. The present volume, therefore, has a more permanent value. It is divided into two main parts; the first, which comprises two-fifths of the whole, deals with General Therapeutics and is the work of one man, Professor R. TURPIN, whereas the eleven chapters of part II, on Special Therapeutics, are contributed each by a separate author, a recognized specialist in his own domain.

In part I Professor TURPIN deals first with treatment by Vaccination. In this, as is natural, BCG receives more credit than it holds at present in British eyes. The author speaks of naturally and artificially attenuated viruses, the use of anatoxins, general technique and results of injection. In this and other chapters of the section, the historical introductions are of great interest. Chapter II deals with Serum Therapy, its applications, results and accidents. Bacteriotherapy follows—the principles of vaccine treatment by homologous and heterologous organisms. The chapter on Chemotherapy is too short. It is not possible to consider adequately in 23 pages the principles of chemotherapy, the various dyes, arsenicals, antimonials and mercurials, but so far as it can accomplish this the work is well up to date, and includes plasmoquine and even atebirin. The inequality in treatment of subjects is exemplified by the fact that the chapter on protein shock and protein therapy is given even more space than that on chemotherapy. The final chapter of this part is devoted to Haemotherapy.

Part II, Special Therapeutics, starts with a short chapter by Professor TANON on Disinfection in Infective Diseases. Surgeon-General DOPTE, whose name is well known to readers of this *Bulletin* and the *Bulletin of Hygiene* deals with the dysenteries; the serum treatment of bacillary dysentery and its results, and vaccine treatment; in amoebic dysentery, the uses, risks and results of emetine, of arsenicals in various forms—novarsenobenzol, stovarsol, treparsol, acetylarsan and sanluol—by yatren, etc., passing on to the modes of dealing with primary attacks, with relapses, and with the disease as it affects children. Ensuing chapters deal with tetanus, influenza, and the bismuth treatment of syphilis, by Drs. L. BAZY, R. Dujarric DE LA RIVIÈRE and Professor LEVADITI respectively. All give a good summary of present-day knowledge of their subjects.

Professor ABRAMI is entrusted with General Principles of the Treatment of Paludism—a short chapter of nine pages; necessarily, therefore, a mere sketch—and he does not touch on prophylaxis. Anti-typhoid vaccination is adequately considered by Professor LEMIERRE, and Professor DEBRÉ gives a good general account of diphtheria, paying due homage to the work of RAMON, SCHMIDT, GLENNY and others whose names are household words in this regard. Vaccine and Serum Therapy of Virus Diseases is divided into three, *viz.*, rabies, poliomyelitis, and yellow fever. For some reason not readily understood more than half the space given to the second of these deals with Weil's

disease and *Sp. icterohaemorrhagiae*. The two final chapters, on the use of convalescent serum in the acute infective diseases, and the use of vitamins, especially vitamin A in infections, do not call for special comment; both are still *sub judice*.
H. H. S.

SHELLEY (Horace M.) [F.R.F.P.S., M.R.C.S., L.R.C.P., D.T.M. & H. (Eng.), Government Pathologist, Nyasaland, East Africa]. **An Epitome of the Laboratory Diagnosis and Treatment of Tropical Diseases.**—pp. xii+81. With 14 figs. Pocket-Monographs on Practical Medicine. 1936. London: John Bale, Sons & Danielsson, Ltd. 83-91 Great Titchfield Street, W.1. [2s. 6d.]

This is a good little book and will doubtless prove of service to the tropical practitioner who has only a small laboratory at his disposal. The character of laboratory referred to will be seen from the list of "articles and reagents required," given in section X of the book. An astonishing amount of useful methods and procedures and hints for carrying out laboratory examinations and indications for treatment is given, and all in four-score pages. The following remarks are made, not in any carping spirit, but as suggestions for a future edition, which is almost certain to be called for soon.

The equipment mentioned includes a haemoglobinometer; it seems a pity therefore to give the Talquist method, and that only, for estimating haemoglobin, without any warning as to the large errors its use may entail. The easy method of estimating the colour index by use of the formula $\frac{H}{2E}$ (H =Hb percentage, E the first two figures of the erythrocyte count) might be given. Unless the denominator 256 (p. 7) in estimating leucocytes is explained as the number of small squares counted, it seems a mere arbitrary figure.

Antisnake venom [meaning snake antivenine] is mentioned in treatment of the haemolysis of blackwater fever, but not the kind nor the dose and hence will not be very helpful to the worried practitioner. It is not the general experience to find the spirochaete of infective jaundice in the urine "during the first three or four days of the disease"; it is rarely seen there before the tenth day. Under Yaws mention might be made of a ready method of obtaining fluid free from blood for examining for spirochaetes, *viz.*, touching the ulcer edge with a pledget of cotton wool dipped in alcohol, the serum will ooze up and often show an abundance of organisms. The diagnosis of melioidosis is not greatly facilitated by the statement that "the organism may be discovered in smears of the sputum" and "the patient's blood serum agglutinates an emulsion of the organism . . ." when nothing is said as to the characters, appearance or even name of the organism.

In the diagnosis of yellow fever we find the peculiar statement "albumin appears in the urine on the second day and increases in amount daily until it finally disappears." The last sentence is self-contradictory. Mention should be made of taking a blood sample of possible yellow fever patients after recovery and sending it to a laboratory for the protection test or in suspected fatal cases a portion of the liver for histological examination. In dengue or any other fever 5,000 leucocytes per cmm. would not be a "marked leucopenia," 1,500-2,000 would be nearer the number.

No indication is given that Oroya fever is merely the generalized form of verruga peruana and that the two are really different aspects of

the one disease. In sprue it is very unusual to find absence of free HCl from the gastric juice, especially if the histamine test be made, and in dealing with treatment something should have been said of Fairley's high protein, low fat, low carbohydrate régime which has met with such success. No means of diagnosing climatic bubo (Lymphogranuloma inguinale) is given, Frei's test receives no mention.

Periodide (p. 74) is one word; there are periodides of several alkalis, and in this case merely implies the interaction of emetine and iodine in certain proportions, so that the final product contains 6 atoms of iodine.

Surely nobody unless he had money to waste would dream of preparing alcohol strengths from absolute alcohol. Absolute alcohol (or as near to absolute as is obtainable) costs about double the 90 per cent., and all dilutions needed can easily be made from this, accurately by Gay-Lussac's table or in round figures by the scale found in most laboratories.

Lastly, misprints are few: Schüffner (p. 2) has a modified u, and similar dots may be seen in quartan parasites in prolonged staining; Schaudinn (p. 34) has two n's, and 10 lines from the end of that page is a misprint; Sir Leonard Rogers is a host in himself and has a plural name. Ascaridole (not ascaridol) is the active principle of oil of chenopodium. In a future edition room might be found for the wrinkle of dipping stained blood slides in paraffin to preserve the colour for future examination, and for the general method of making up any solution of a desired strength from one of greater concentration without waste of material or the need for keeping several strengths. The page of diagrams of helminthic ova would be more serviceable if drawn to scale.

There is so much that is good in this book that the foregoing suggestions have been put forward for consideration of the author, who may see fit to adopt some of them in future editions. There is no question that the work was well worth the undertaking and that many tropical practitioners will be grateful to Dr. Shelley for it and to the publishers for producing the book in so handy a form at a price so absurdly low.

H. H. S.

VILLAIN (Georges) [Médecin-Inspecteur de l'Hygiène Publique à la Direction Générale de l'Intérieur, à Tunis]. **Guide pratique d'examen microscopique du sang appliqué au diagnostic du paludisme. Suivi de : Technique, indications et résultats de la mélanofloculation** par A. F. X. HENRY. [The Diagnosis of Malaria by Microscopical Examination of Blood.]—93 pp. With 5 figs., 1 chart & 7 coloured plates. [Supplément à la Biologie Médicale 1935.]

This Supplement to Biologie Médicale 1935 aims at providing the worker, who is deprived of the facilities of a modern medical library, with a practical handbook to enable him to profit from use of his microscope, which is indispensable in the diagnosis of malaria. The final sections are devoted to indications for use of the Melano-floculation test, its technique and interpretation.

Notes on the making and staining of thin and thick blood films are essentially practical, but are almost too brief in regard to the latter.

A general and differential description of the three chief malarial parasites with the associated blood changes is followed by corresponding notes on *Pl. ovale*.

Appreciation of the changes to be found in the blood cells is assisted by a section on normal and abnormal blood cells.

Note is made of other blood parasites which may be encountered, and some of the appearances which may simulate malarial parasites are explained.

A full page coloured plate is devoted to each of the four types of malarial parasites, and a fifth to thick film preparations. Two other plates illustrate blood cells and *Leishmania* and *Spirochaetes* which are met in N. Africa.

An evening's careful study of this handbook should enable a man, who knows how to use his microscope, but who is inexperienced in malaria, to prepare and stain a satisfactory blood film, and to form from it an opinion in regard to malaria. He will also be stimulated to search for further information on the interpretation of his findings from the larger text books which deal with protozoology and with malaria as a disease.

P. H. Martin.

- i. PAVLOVSKY (E. N.). **Textbook of Human Parasitology**.—592 pp. With 3 plates & 381 text-figs. 1934. Leningrad. (State Publishers of Biological and Medical Literature.) [In Russian.] [Roubles 9·20].
- ii. PAVLOVSKY (E. N.) [Edited by] and Others. **Practical Course of Medical Parasitology**.—434 pp. With 230 text-figs. 1935. Leningrad. (State Publishers of Biological and Medical Literature.) [In Russian.] [Roubles 6·85].

The two books under review are based on many years of practical experience in teaching parasitology at the Military Medical Academy in Leningrad under the direction of Prof. Pavlovsky, who is one of the pioneers of Russian parasitology. The course is adapted to the needs of medical men and students and biologists in general, and deals mainly with the parasites and vectors encountered in the territory of the Soviet Union. An account is also given of the epidemiology of the various parasitic diseases, while the clinical and therapeutic aspects of these infections are omitted.

i. The theoretical course is divided into two sections, general and special. In the first a summary account is given of parasitism and the general problems of parasitology. The special section includes protozoology, helminthology and arachno-entomology, with special reference to the vectors of infection. The description of each parasite comprises its morphology, life cycle, sources of infection, bionomics, pathological effects and prophylaxis. In the case of fleas and mosquitoes (*Anopheles*) there are keys for the determination of genera and species respectively. Among the numerous illustrations many are original. In the part devoted to arachno-entomology, which is the author's speciality, the biology and ecology of insect vectors receives particular attention. This work is the only one of its kind in the Russian language and is of the high standard one usually associates with the author's name. The treatment of the subject throughout is authoritative and stimulating, so much so that one regrets that it is inaccessible to the foreign reader.

ii. The "Practical Course" is a companion-volume to the preceding book, and covers the same ground, with the addition of an appendix dealing with the poison-organs of various animals. The work is collective, the different sections being written by Prof. Pavlovsky and

a team of specialists. After a description of general laboratory technique, an account is given of the method of collecting, preserving and dissecting the parasites. The methods of dissection of insects, illustrated by original anatomical drawings, are of special value. In the case of mosquitoes and some other insects detailed instructions are given for conducting field observations on various stages of the insects. The practical text-book is thus a valuable guide to laboratory and field workers of different categories.

C. A. Hoare.

PAVLOVSKY (E. N.) [Edited by]. **Materials on the Parasitology and Fauna of Southern Tadzhikistan.—The Tadzhik Complex Expedition of 1932 and the People's Commissariat for Health of the Tadzhik S.S. Republic. Fasc. X. Reports of the Expedition.**—354 pp. 1935. Leningrad. (Published by the Academy of Sciences of U.S.S.R.) [In Russian.]

In 1932 the Academy of Sciences of U.S.S.R. organized a "Complex" Expedition to Tadzhikistan (Middle Asia) with the object of making a comprehensive survey of all the natural resources of that country. It also included the study of the human inhabitants with special reference to public health. One of the expeditions, led by Prof. Pavlovsky of the Military Medical Academy, was charged with the parasitological and faunistic investigations, the results of which are recorded in this volume.

E. N. PAVLOVSKY ("On *Ornithodoros* inhabiting burrows in Tadzhikistan, and their relation to the spread of relapsing fever," p. 19) demonstrated that *Ornithodoros* in all stages of development were widely distributed in the burrows of tortoises, hedgehogs, rodents and other animals, upon which they fed. It was found that under experimental conditions these ticks do not transmit spirochaetes to guinea-pigs. However, *O. papillipes* found in caves in the Caucasus have been known to infect human beings with relapsing fever. The author was also able to demonstrate that the spirochaetes remained viable and virulent in ticks kept in laboratory conditions without food for 4½ years. These facts show that this species (and possibly others) even when found in abandoned dwellings or in natural biotopes are capable of retaining the virus almost indefinitely, thus constituting a potential source of infection. In a paper "On the effect of the bite of *Ornithodoros* and *Argas* upon the human skin" by E. N. PAVLOVSKY and A. K. STEIN (p. 45), a differential diagnosis is given of the dermatological picture obtained in the case of each of the two genera. The paper is illustrated by a coloured plate depicting the various types of papules.

A. HOSTYŠA (p. 55) deals with the pathology of the comatose form of malaria, based on 42 cases. V. G. FEDOROV (p. 85) writes "On the fauna of blood-sucking mosquitoes of the town Stalinabad," while P. PERFILEV (p. 94) gives a morphological and systematic description of "The sandfly fauna of Middle Asia," together with a key for the identification of females and males respectively. It is pointed out that *Phlebotomus barowskii* Chodukin, 1931, probably represents *P. sergenti* var. *mongolensis*. The incidence and ecology of ticks are dealt with by M. POSPELOVA-STROM in the following papers: "On the ticks of wild animals of the Tadzhik S.S. Republic" (p. 113) and "Contributions to the knowledge of the ticks of domestic animals in Tadzhikistan" (p. 135). V. G. FEDOROV (p. 149) provides a list of ectoparasitic arthropods from dogs of Stalinabad. E. N. PAVLOVSKY and A. GRZYCKIJ (p. 155) devote

a paper to " Human beings bitten by the karakurt in the Baumanabad district of Tadjik S.S.R." in which 9 cases are described. The characteristic symptoms of the bite of *Latrodectus tredecimguttatus* are as follows : cyanosis of the face, neck and upper half of the body ; oedema of the eye-lids, dilatation of the pupils, dryness of the tongue, slow and irregular pulse, muffled heart sounds, limitation of excursions of the lung, respiratory irregularities, copious perspiration, constipation and retention of urine, muscular tremors and the appearance of albumen in the urine. All these symptoms usually disappear by the fifth day. The site of the bite is represented by a pinkish spot with two red points in the middle.

E. N. PAVLOVSKY (p. 169) further records some " Observations on the ' domestic inhabitants ' and poisonous animals in Tadjikistan," treating man and the various animals sharing his dwelling as a biotic community, with special reference to their epidemiological rôle.

G. G. SMIRNOV (p. 203) provides " Materials for the helminthic fauna of the aboriginal and immigrant population of Tadjikistan " : the incidence of worms in the latter category (17·2 per cent.) proved to be twice as high as in the former (8 per cent.). In a paper " Sur la faune des trématodes de Tadjikistan " (p. 219) I. SHTROM (= Strom) gives a description of the trematodes found in various classes of vertebrates. These include two new species ; *Lyperosomum gorbunovi* sp. n. from *Cotyle riparia* (Aves) and *Lecithodendrium rotundum* sp. n. from a bat, *Rhinolophus hipposideros*, the description of which is given in a French summary. The remaining four papers are concerned with the non-parasitic fauna and with the water-supply of the villages.

C. A. Hoare.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

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[No. 5.]

YELLOW FEVER.

- i. JAMES (S. P.). Renseignements sur la fièvre jaune reçus au cours des six mois finissant le 30 septembre 1935. [**Information on Yellow Fever received during the Course of the Six Months ending 30th September, 1935.**—*Bull. Office Internat. d'Hyg. Publique*. 1935. Dec. Vol. 27. No. 12. pp. 2354–2357.]
- ii. SOREL. Le diagnostic histologique rétrospectif de la fièvre jaune dans les colonies françaises. [**A Retrospective Histological Diagnosis of Yellow Fever in French Colonies.**—*Ibid.* pp. 2358–2359.]
- iii. BABLET (J.). Note préliminaire sur le diagnostic histologique de la fièvre jaune. [**A Preliminary Note on the Histological Diagnosis of Yellow Fever.**—*Ibid.* pp. 2360–2364. With 2 coloured plates.]
- iv. LLOYD (Wray). L'emploi d'un virus cultivé associé à l'immunsérum dans la vaccination contre la fièvre jaune. [**The Use of Culture Virus together with Immune Serum in Vaccination against Yellow Fever.**—*Ibid.* pp. 2365–2368.]
- v. BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1935. Dec. Vol. 27. No. 12. pp. 2369–2370.—Rapport de la commission de la fièvre jaune. [**Report of the Yellow Fever Commission.**]

i. During the course of 1935 up to the end of September, cases of yellow fever have been recorded from Bolivia, Brazil and Colombia, in South America; and from the French Congo, Dahomey, Ivory Coast, Niger Territory, Togo, Gambia, Gold Coast, and Sierra Leone, in Equatorial Africa. In South America, especially Brazil, there have been epidemics with many deaths, but in Africa only sporadic cases have been reported.

With reference to the specificity of the mouse protection test FINDLAY has tested the serum from a case of "Congolese Red Fever" [see this *Bulletin*, 1935, Vol. 32, p. 881] and found that it contained no yellow fever antibodies.

The Bathurst epidemic in 1934, although apparently almost entirely limited to Europeans, was accompanied by a general increase in the mortality amongst the native population, and out of 36 young men resident in the town, the blood of 16 protected against yellow fever.

In the interior of the Colony protection tests have given the following results :—

Localities	Number of persons examined	Number of protection tests positive	Age Groups among which occurred the positive tests
Basse (Upper River Province)	53	10	9-40 years
Georgetown (McCarthy Island)	49	14	4-40 ..
Kerewan (North Bank Province)	38	12	4-40 ..
Bakau (South Bank Province)	45	13	4-40 ..
Brikama (Kombo) ...	44	13	4-40 ..

Evidence is also presented showing that in Gambia, as in Brazil, there are two types of yellow fever, one urban, and the other rural, the latter occurring in isolated districts where *Aedes aegypti* has not been found and the problem of whether man is the only reservoir of infection is very uncertain. The examination of monkeys and domestic animals near Bathurst has given negative results, but in the forest region of Ashanti on the Gold Coast, the blood of a *Colobus* monkey protected against yellow fever, as well as that of one child out of 12 examined. In London 565 persons have now been vaccinated by means of virus and immune serum, and preference is given to the use of human immune serum in place of any heterologous serum. The neurotropic virus has been generally used, but in 21 persons cultivated virus has given equally satisfactory results, and recently Dr. FINDLAY has used an attenuated viscerotropic strain supplied by Wray LLOYD [see below].

ii. Up to October 1st, 1935, 34 specimens of liver from Europeans who had died after febrile periods of less than 10 days had been received from various French Colonies and examined at the Institut Pasteur by Dr. BABLET. Histological evidence of yellow fever was found in specimens from Niger Territory, Ivory Coast, Dahomey and Togo, also from Brazzaville and Pointe Noire, in French Equatorial Africa.

iii. Specimens not larger than 1 cm. cube are fixed in 15 per cent. formalin for 8 days and then transferred to 5 per cent. formalin for transport. Frozen sections of such material can be stained with Scharlach R or Sudan III, and at once show any sign of fatty degeneration. Paraffin sections are stained either with Mallory's phosphotungstic haematoxylin, or Masson's trichromic stain [Haemalum, Eosin and Saffron].

The characteristic features are found to be : (1) fatty degeneration of varying intensity accompanied by extensive necrosis of the cellular regions ; (2) a diffuse leucocytic infiltration, concentrated in perivascular masses in the portal cavities ; (3) the bile ducts and great vessels are unaffected. In addition the author gives a useful discussion of the main features distinguishing yellow fever from other pathological conditions.

iv. The author records experiments, in conjunction with THEILER and RICOT, in which a viscerotropic strain has been maintained in

tissue culture, containing pieces of mouse embryo, for 130 passages during a period of 21 months. Before culturing, this strain was invariably fatal to monkeys, but during the course of this period it has gradually lost its virulence and from the 45th to 109th passage 17 monkeys inoculated with this culture virus have all survived. On the other hand, its neurotropic properties, as tested by intracerebral inoculations into mice, do not seem to have altered. This attenuated virus was passed through a series of 20 *rhesus* monkeys and the 5th, 6th and 20th animals died of yellow fever, the others showing at the most a slight febrile reaction. From the 20th to the 28th passage, however, there was a definite return to the original virulence.

Twenty persons have been successfully immunized by the injection of known quantities of this cultivated virus together with quantities of human immune serum ranging from 0.5 cc. to 0.6 cc. per kilo body weight. Only three had any fever ($37.7^{\circ}\text{C}.$) ; four others showed a slight rise in temperature of half a degree or less, and the remaining 13 no reaction whatever. The blood of five of these subjects was tested 14 to 28 days after vaccination and all showed the presence of yellow fever antibodies in titres ranging from 1/8 to 1/128.

v. After referring to some of the investigations mentioned above, the Commission recommends the adoption of certain measures to prevent the possibility of the infection being carried by aircraft, and the transformation of existing aerodromes not only in Africa but also at Karachi, India, into anti-yellow fever aerodromes. *E. Hindle.*

SAWYER (W. A.) & WHITMAN (Loring). **The Yellow Fever Immunity Survey of North, East and South Africa.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Jan. 25. Vol. 29. No. 4. pp. 397–412. With 2 maps. [12 refs.]

This valuable paper completes the general survey of the continent, started early in 1931 by the International Health Division of the Rockefeller Foundation with the co-operation of the governments concerned, and in addition contains a brief summary of the results obtained in previous reports.

It is only possible to give the main conclusions of this paper and for details the original should be consulted. It is shown that in Africa, yellow fever in man, as determined by blood tests in mice, is widely but irregularly distributed in a region extending from the coast of Senegal eastward for approximately 3,300 miles to the upper reaches of the White Nile in the Anglo-Egyptian Sudan. On the north this region is limited by the Sahara Desert. On the west and south the boundary follows the coast of the Atlantic Ocean from Senegal to the extreme north of Angola, then eastward across Angola and the southern part of the Belgian Congo. The region has a maximum width of about 1,400 miles and lies between latitudes $16^{\circ}\text{N}.$ and $6^{\circ}\text{S}.$

A few isolated blood specimens with protective serum obtained from individuals outside this region are explained as probably being due (1) to infection as a result of visiting some distant place, (2) to sporadic infection with virus introduced into the locality, or persisting there under conditions unfavourable to the spread of the infection, or (3) to an exceptional concentration of some non-specific factor in the blood.

Within the region of immunity there were areas in which no immunes were discovered, others in which only a small proportion of the adults

were immune, and still others in which considerable proportions of both adults and children had protective serum. But the whole region must be regarded as endemic, as the disease is always present and widely distributed.

The western area, extending to the eastern border of Nigeria and including the coastal region from Nigeria to Angola, has had numerous epidemics of yellow fever and is still having them. All the historic outbreaks have occurred there, except the two introductions of yellow fever into Morocco in 1804 and 1881, and the yellow fever in coastal towns of Angola up to 1889. In West Africa, the existence of frequent urban and town epidemics in which *Aedes aegypti* is undoubtedly the vector, would make it almost impossible to recognize any method of transmission or persistence, other than the common one previously established. In the eastern area, including the remainder of the region of immunity, the situation is radically different, for yellow fever has never been recognized except for a single *probable* case recorded by HEWER in the Anglo-Egyptian Sudan [see this *Bulletin*, 1934, Vol. 31, p. 833]. Europeans stationed in places where a large proportion of the natives are immune have never been known to contract the disease, and the heavily immunized areas would seem to be continuously endemic rather than epidemic. It is possible, however, that the immunizing infection may be with strains of lowered virulence, or a selective virulence, or a different set of tissues. This is suggested by the extensive alterations occurring in the laboratory, and by minor differences in virulence between virus strains from different sources.

Within this eastern area there is an ill-defined zone between latitudes 3°N. and 8°N. giving a high prevalence of immunity among children and adults. There is a diminishing incidence of immunity to the north and south of this zone.

The environmental conditions which favour yellow fever immunization are largely unknown. They may be similar to those responsible in the case of jungle yellow fever in South America, or may be peculiar to Africa. The existence of this zone of high prevalence would seem to offer an excellent opportunity for an intensive study by epidemiologists, pathologists, bacteriologists, entomologists and zoologists to determine (1) the symptomatology and pathology of the disease produced by the immunizing infection, (2) the characteristics of the prevailing strain of yellow fever virus, (3) the identities and habits of the blood-sucking arthropod vectors, and (4) the presence or absence of warm-blooded animal hosts other than man. Studies along these lines should make it possible to estimate the extent of the danger from yellow fever in Central Africa and the probability of its spread to the eastern coast, and should also help to determine the most suitable precautionary measures.

E. H.

VAN DEN BERGHE (Louis). L'immunité amarile de sérums prélevés chez des ictériques en Uélé (Congo Belge). [**Yellow Fever Immunity in Sera from Cases of Jaundice in Uélé (Welle), Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1935. Dec. 31. Vol. 15. No. 4. pp. 561-566.

A discussion of the problem of yellow fever immunity in the Belgian Congo, together with the results of the examination of serum from 62 inhabitants of the Uélé (Welle) District.

The author draws attention to the curious fact that in many districts of the Belgian Congo where yellow fever has never been recognized clinically, the results of protection tests indicate a higher percentage of infection than in many coastal districts where epidemics have occurred.

The existence of fairly numerous cases of febrile jaundice in the Ubangi and Uélé Provinces suggested the possibility of there being yellow fever, but serological examinations of these cases showed no higher percentage giving positive protection tests than in the surrounding population. Tests for spirochaetal jaundice were negative and therefore one must assume the existence of epidemics of another type of febrile jaundice. The cases closely resemble those recently described in Nigeria by BEEUWKES, WALCOTT and KUMM [see this *Bulletin*, 1931, Vol. 28, p. 858] and also in Colombia by BAUER and KERR,* as well as in various European countries. The aetiology of this disease at present is unknown.

E. H.

NIGERIA, COLONY AND PROTECTORATE OF : REPORT ON THE MEDICAL AND HEALTH SERVICES FOR YEAR 1934. [*Yellow Fever* p. 16.]

The Annual Report of the Medical Department of Nigeria contains a brief account of a small outbreak of yellow fever in the Northern Provinces. In November–December 1934 there was a large influx of persons from the northern borders into Katsina and Kano Provinces. Existence of the disease was known at Zinder and elsewhere to the north during the preceding three months, and it is possible, or even probable, that infection was thus imported. No cases were reported in the Southern Provinces, suspected cases, one at Mamfe, and one at Ife, not being confirmed. Three Europeans were infected; the first on November 21st, an administrative officer who had been touring the Gaya district 40 miles east of Kano; on the 27th of the same month, a Frenchman residing at Ringim 44 miles from Kano (this patient died); on 1st December a resident of Kano.

Immediate steps were taken. The township and Government Station of Nasarawa were declared an infected area. A mosquito survey was made and huts in the neutral zone where breeding of *Aedes* was prevalent were demolished, and a careful scrutiny of African fever cases undertaken and 6 suspicious cases were reported. By the protection test 3 were negative, 1 doubtful and 2 positive. This is, of course, not conclusive evidence that any of them were really cases of the disease. The reduction in mosquitoes was greatly assisted by a severe harmattan during the period in question and this, doubtless, played a part in limiting the outbreak.

H. H. S.

GAMBIA, COLONY OF THE : ANNUAL MEDICAL AND SANITARY REPORT FOR THE YEAR 1934 [BERMINGHAM (H. J.), Acting Senior Medical Officer]. [*Yellow Fever* pp. 55–57. Appendix I.]

Dr. H. J. BERMINGHAM, Acting Senior Medical Officer, recorded the reappearance of yellow fever in the Colony during the last quarter of 1934. There were 5 cases in all, two in October, one in November and two in December, 4 Europeans, 1 African, all fatal. The measures adopted on discovery of the first case were: More active antimosquito measures; evacuation and fumigation of the house where a case

* *Bol. Oficina Sanitaria Panamericana*. 1933. July. Vol. 12. No. 7. pp. 696–715.

occurred and those in the immediate neighbourhood ; examination of Europeans in the vicinity (they were subsequently moved to more healthy areas) ; issue of warning notices to the public regarding precautions against mosquito-borne diseases ; enforcement of quarantine. Bathurst was declared an " infected place " in November. Dr. J. A. A. DUNCAN, Assistant Director of the Health Service, Sierra Leone, was called in to assist and an intensive sanitary campaign was inaugurated. House-to-house inspection was undertaken, the town was cleansed, eaves and gutters were removed, wells on Government property closed, four bush type incinerators erected, sumps and soakage pits to stand-pipes, and ditches and drains holding water were oiled, long grass was cut and burnt, lighters, barges and boats along the foreshore were inspected, unprotected water tanks were oiled, in short an attempt was made to remove all conditions favouring mosquito breeding. Towards the end of December all European officials moved to Cape St. Mary and non-officials were recommended to do the same. None was allowed to return to Bathurst to reside unless protected by inoculation. The sanitation of Bathurst is below a satisfactory standard even after the extra and more intensive efforts. The problem is largely one of drainage and presents considerable difficulties. H. H. S.

BIRAUD (Yves). **Present-Day Problems of Yellow-Fever Epidemiology.**—*League of Nations Epidemiol. Rep.* 1935. July-Sept. Vol. 14. No. 7-9. pp. 103-173. With 10 maps. [10 pages of refs.] [In parallel French & English.]

An excellent general account of the subject with a series of maps illustrating the distribution of yellow fever and its vectors, and also the results of protection tests and viscerotomy. The author deals especially with the present world distribution of yellow fever ; its reservoirs and vectors ; the natural and artificial possibilities of its spreading and methods of preventing any such spread ; and, finally, the methods of control and eventual eradication of infection from areas where it persists in an endemic or endemo-sporadic form.

Although the article contains nothing original it is a useful summary of recent advances in our knowledge of the epidemiology of yellow fever. E. H.

BONNE (C.). Over de afwezigheid van immuniseerende stoffen tegenover gele koorts virus in het bloed van bewoners van Java. [**Absence of Yellow Fever Antibody in the Blood of Javans.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1935. Dec. 24. Vol. 75. No. 26. p. 2183.

The sera of 39 natives of Java and of 10 Chinese were tested for their protective character against neurotropic yellow fever virus in mice. Usually 6 mice were used for each serum. It was found that with native sera one mouse remained alive after test six times and in one instance two mice. With sera of the Chinese, one mouse remained alive three times. These survivals in the experiments have no significance in the interpretation of the results and the conclusion drawn is that yellow fever immune body was not present in the sera tested.

W. F. Harvey.

FINDLAY (G. M.), STEFANOPOULOU (G. J.), DAVEY (T. H.) & MAHAFFY (A. F.). **Yellow Fever Immune Bodies in the Blood of African Animals. Preliminary Observations.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Jan. 25. Vol. 29. No. 4. pp. 419-424. [11 refs.]

A record of the results of the examination of the blood of 25 apes and monkeys, and 25 other kinds of mammals and birds, from Africa, in order to determine the presence of yellow fever immune bodies.

The primates examined were obtained in 1934 from the Gold Coast and French Guinea, and in 1935 from Bathurst, Gambia and the Belgian Congo, and comprised 6 chimpanzees and 19 other monkeys. Seventeen Asiatic monkeys were used as controls and all were negative. Of the African monkeys, three were positive, a chimpanzee from French Guinea, a baboon from the Belgian Congo, and a *Colobus* monkey from the Gold Coast. Human sera protecting against yellow fever have been obtained from the same areas.

The bloods of a number of wild and domestic animals and birds were all negative except those of two sheep from the Gambia, one of which protected in a dilution of 1 in 64, the other to 1 in 8. One of six English sheep used as a control also protected in a dilution of 1 in 2, though not when 1 in 4.

These results suggest that in rural as opposed to urban areas, monkeys may play some part in maintaining the continued existence of yellow fever. E. H.

LAIGRET (J.). La vaccination préventive contre la fièvre jaune. [**Preventive Vaccination against Yellow Fever.**]—*Rev. d'Immunologie.* Paris. 1935. Mar. Vol. 1. No. 2. pp. 113-133.

A useful summary giving exact details of the method of yellow fever vaccination advocated by the author and the results of its application in French West Africa.

This method of giving three injections of living mouse virus, attenuated by keeping the infected brains at 20°C. for one, two and four days respectively, has now been applied to thousands of volunteers in various French territories during the past five months, and apart from a slight reaction without fever on the 5th to the 8th day, or a febrile reaction on the 6th day, only two cases have shown any nervous symptoms. Both these recovered and all the other reactions were benign.

In a general discussion of this method the author points out that the results of its application in the field, show that it is unnecessary to accompany the vaccination with a dose of immune serum. In regions where the transmitting mosquito abounded, vaccination has not been followed by any cases of yellow fever, and in two regions, the Ivory Coast and Niger Territory, where the disease existed, vaccination did not result in any recrudescence of the epidemics. The duration of the immunity has now been tested up to three years, but the author recommends that the vaccination should be repeated every two years. E. H.

LAIGRET (J.) & BONEAU (E.). Longue persistance de l'immunité conférée par la vaccination de la fièvre jaune. [**The Long Duration of Immunity produced by Yellow Fever Vaccination.**]—*C. R. Acad. Sci.* 1936. Jan. 13. Vol. 202. No. 2. pp. 172-175.

The authors have tested the immunity of five patients who had been vaccinated against yellow fever by the inoculation of living mouse

virus, at intervals ranging from 8 months to 4 years. One of these patients had been vaccinated by a single dose of "coated" vaccine eight months previously [see this *Bulletin*, 1935, Vol. 32, p. 880]. It is stated that in each case there was no diminution in the immunity, the serum always containing at least 6,400 protective units per cubic centimetre. E. H.

MATHIS (C.), DURIEUX (C.) & ADVIER (M.). La vaccination anti-amarile comporte-t-elle des dangers dans les régions où la fièvre jaune sévit endémiquement et où les "*Stegomyia*" abondent? (Deuxième note.) [*Is Yellow Fever Vaccination Dangerous in Regions where Yellow Fever is Endemic and where *Stegomyia* is Common? Second Note.*—*Bull. Acad. Méd.* 1935. Dec. 3. 99th Year. 3rd Ser. Vol. 114. No. 39. pp. 510-520.]

After a general discussion of the problem an account is given of four experiments in which mosquitoes were fed first on patients that had received six consecutive vaccinating doses, amounting to 22 mgm. of infected mouse brain instead of the usual 2 mgm., and subsequently on normal human subjects.

In the first experiment the three natives were inoculated with the above mentioned six doses and whilst undergoing this treatment various batches of mosquitoes, *Aedes aegypti*, were fed on them each day from the 2nd to the 15th day after the treatment had begun. These (156) mosquitoes were fed on a normal subject 14 to 17 days later who was subsequently bitten by a second lot of mosquitoes fed on other vaccinated persons, in both cases without producing any signs of yellow fever infection. Four other subjects were exposed to the bites of mosquitoes that had been fed similarly on vaccinated persons, also with negative results.

The authors conclude, therefore, that there is no danger of yellow fever being transmitted from vaccinated subjects by the bites of mosquitoes. E. H.

FINDLAY (G. M.) & STERN (Ruby O.). **The Essential Neurotropism of the Yellow Fever Virus.**—*Jl. Path. & Bact.* 1935. Nov. Vol. 41. No. 3. pp. 431-438.

An interesting account of experiments showing that the virus of yellow fever possesses an inherent neurotropic capacity, even in a species like the *rhesus* monkey, which is normally highly susceptible to the ordinary viscerotropic virus.

When this latter type of virus is instilled intranasally into *rhesus* monkeys it produces ordinary yellow fever but in mice gives rise to encephalomyelitis. If a *rhesus* monkey is inoculated intracerebrally with the same virus after a subcutaneous injection of yellow fever immune serum, it develops encephalitic symptoms associated with microglial proliferation, perivascular infiltration and intranuclear inclusions in the brain, and only slight lesions in the liver. However, if the monkey is inoculated with the virus before the immune serum, it does not develop encephalitic symptoms, but dies of ordinary yellow fever, the only brain lesion being microglial proliferation.

In *rhesus* monkeys dying of encephalitis as a result of intracerebral inoculation of viscerotropic virus, at death virus is found only in the brain, and not in the blood or liver where it has apparently been neutralized by the subcutaneous injection of immune serum.

These results provide additional evidence in support of the view that neurotropic potentialities are inherent in the ordinary strain of yellow fever virus and suggest that natural selection tends to favour the multiplication of virus particles specially adapted either to growth in the viscera, or to growth in the nervous tissues, according to the particular environment (*i.e.*, tissue) in which the virus is placed.

E. H.

HOSKINS (Meredith). Treatment of Experimental Yellow Fever Encephalitis with Specific Immune Serum.—*Amer. Jl. Trop. Med.* 1935. Sept. Vol. 15. No. 5. pp. 545-549.

The title of this paper is somewhat misleading as actually the immune serum was inoculated into *rhesus* monkeys 3, 4 or 6 hours before a subsequent intracerebral injection of neurotropic yellow fever virus.

The immune serum was inoculated into the cisterna after withdrawing a similar volume of cerebrospinal fluid. Doses of 1.75 cc. up to 6.0 cc. were used and obviously affected the course of the disease which was significantly longer than in the controls; also 6 out of 31 test animals survived.

E. H.

HOSKINS (Meredith). A Protective Action of Neurotropic against Viscerotropic Yellow Fever Virus in *Macacus rhesus*.—*Amer. Jl. Trop. Med.* 1935. Nov. Vol. 15. No. 6. pp. 675-680.

A record of experiments with *rhesus* monkeys inoculated simultaneously and at intervals up to 48 hours with both types of virus—the viscerotropic virus being inoculated first.

The results are summarized in the following table:—

Interval between inoculation of viscerotropic and neurotropic virus	Fate of Test Monkeys				Total
	Number survived	Number died of			
		Viscero- tropic Yellow Fever	Yellow Fever Enceph- alitis	Inter- current Infec- tions	
<i>Hours</i>					
0	13	1	1	3	18
16	3	0	0	0	3
19	2	0	0	0	2
21	0	1	0	0	1
24	7	8	0	1	16
30	1	1	0	0	2
48	1	5	0	0	6
Total ...	27	16	1	4	48

It is obvious, therefore, that neurotropic virus has a definite protective effect when administered simultaneously with viscerotropic virus and to a lesser extent when administered up to 24 hours afterwards. There is no adequate explanation for these rather surprising results.

E. H.

SMITH (E. C.). **Nigerian Insectivora (Hedgehogs and Shrews)—their Reaction to Neurotropic Yellow Fever Virus.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Jan. 25. Vol. 29. No. 4. pp. 413–416. With 4 figs. on 1 plate.

The author shows that hedgehogs (*Atelerix albiventris*) from Northern Nigeria are susceptible to the neurotropic strain of yellow fever virus when inoculated intracerebrally; shrews (*Crocidura manni*) obtained in Southern Nigeria were not susceptible to the same virus.

Thirteen hedgehogs were inoculated intracerebrally and all showed paralytic symptoms, 7 of them dying (or being killed *in extremis*) after an average period of 10.5 days from the time of inoculation. The pathological changes in the brain were typical and in addition necrotic changes were present in the liver of two of the animals examined. Four hedgehogs inoculated subcutaneously gave entirely negative results. Eight shrews inoculated intracerebrally and four subcutaneously with the same virus gave negative results and a protection test with the pooled sera of four normal shrews was also negative.

E. H.

FINDLAY (G. M.) & MAHAFFY (A. F.). **The Susceptibility of Nigerian Hedgehogs to Yellow Fever.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Jan. 25. Vol. 29. No. 4. pp. 417–418.

Six Nigerian hedgehogs, probably *Atelerix albiventris*, from Kano, Northern Nigeria, were found to be highly resistant to infection with viscerotropic yellow fever virus, as tested by both intraperitoneal and intracerebral inoculations.

This resistance was not due to the presence of immune bodies in the blood previous to inoculation, and is in marked contrast to the susceptibility of the hedgehogs from Omdurman, Anglo-Egyptian Sudan, which are supposed to be the same species. It is suggested that there may be a physiological difference between the Sudanese and Nigerian hedgehogs. It is of interest that the susceptible hedgehogs came from a region where yellow fever has never been known to occur, whilst the resistant animals came from Kano, where epidemics of yellow fever are not uncommon and the disease may be endemic.

E. H.

SALEUN (G.) & CECCALDI (J.). Apport du virus amaril "souris" en A.E.F. [Store of Yellow Fever "Mouse" Virus in French Equatorial Africa.]—*Bull. Soc. Path. Exot.* 1935. Oct. 9. Vol. 28. No. 8. pp. 693–695.

A brief record of infection experiments with a neurotropic strain of yellow fever obtained from Dakar which has undergone 18 mouse passages at Brazzaville, and previously 204 passages at Dakar. The material was brought from Dakar in the form of infected mouse brains in a thermos flask and kept in the cold room during the voyage. When tested there was a slight alteration in virulence which was restored after a few mouse passages.

The authors have made a few inconclusive sero-protection tests in the Congo, and hope to use the virus for further studies of the disease in Equatorial Africa.

E. H.

ZANETTI (V.). La lutte contre les moustiques à Matadi en 1933. [**The Anti-Mosquito Campaign at Matadi in 1933.**]*—Ann. Soc. Belge de Méd. Trop.* 1935. Mar. 31. Vol. 15. No. 1. pp. 127–154. With 1 chart.

Energetic measures, adopted as a result of an epidemic of yellow fever in 1928, have produced a radical transformation in the sanitary condition of Matadi, the port of the entire Congo basin. For Matadi and the vicinity, the sole natural mosquito breeding places are two main ravines and a number of subsidiary ones, for in the swiftly flowing Congo, with its steep banks, breeding is impossible. Within the urban area, part of the ravines have been rendered permanently safe by being floored with cement; in the dry season other ravines are regularly cleared and oiled, under the bi-weekly supervision of a maintenance squad. During the rains, unless scoured out by a fresh downpour within seven days, residual breeding places are either suppressed or oiled. The necessity of unremitting supervision is emphasized. In 1928 the ravines, with domestic breeding places, formed the two main problems; they are now devoid of danger, since each breeding centre is at once located and dealt with. Tree-inspection is not neglected, and holes in papaw trunks, a favourite breeding place of *Aedes* [see this *Bulletin*, 1934, Vol. 31, p. 503], are filled in with tar cement. In the urban zone the predominant anopheline is *A. gambiae (costalis)*, which as its breeding places are suppressed tends to be replaced by *A. rhodesiensis*.

Though permanent and minor sanitary measures, including maintenance of the latter, should be employed together and are mutually complementary, it is suggested that recourse should always be had at the outset to the lesser methods of mosquito control, permanent measures being adopted only when justified by the cost of labour and material necessary to carry out and maintain work of the other kind. For the purpose of maintenance, the surest and most economical weapon is fuel oil.

E. E. A.

SYMES (C. B.). **Insects in Aeroplanes. A Brief Report and Suggestions.**—*Records of Med. Res. Lab., Nairobi (Entomological Section)* No. 6. 1935. 16 pp. With 4 figs. Nairobi: Govt. Printer.

The author is concerned with the possibility that aeroplanes may import certain dangerous insects, particularly mosquitoes infected with the virus of yellow fever, into Kenya. He discusses methods of ridding aeroplanes of insects.

Aedes aegypti is widely distributed in East Africa and a list of localities in which it is known to occur is given, though the author does not state whether it is still an urban insect or widely distributed in the countryside. As yellow fever has been recorded in the Bahr el Ghazal it is clear that there is a real danger of the carriage of an infected mosquito over long distances, and it has been shown that the carriage of mosquitos in aeroplanes is not rare. The author gives details obtained by searching aeroplanes on arrival in Kenya from various directions. Considerably over one hundred machines have been searched, some of which were apparently free of insects: but others contained considerable numbers of insects, mainly mosquitoes, though no example of *Aedes aegypti* has actually been detected. Attention is called to the fact that Kisumu is a place at which mosquitoes are particularly likely to board planes.

In the Sudan and East Africa the destruction of mosquitoes in planes is generally carried out by an insecticidal spray and an atomizer. The author describes attempts to disinfest planes by short exposures to high concentrations of hydrocyanic acid. The results are not very satisfactory because the structure of an aeroplane is so complex and because so many parts of it are not readily accessible.

P. A. Buxton.

BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1935. Mar. Vol. 27. No. 3. pp. 550-560.—Sur la destruction des moustiques à bord des aéronefs. [**The Destruction of Mosquitoes in Aircraft.**] [GRIFFITTS (T. H. D.) & MICHEL (Carl), U.S. Pub. Health Service.]

The United States Public Health Service having proved conclusively that *Aedes aegypti* can be carried by aircraft for long distances, and on flights lasting three or more days, the necessity of destroying these insects in aeroplanes is insisted upon. Either a fumigant (the more radical method) or a spray can be used, the latter being employed in the various compartments of the machine before departure, during flight, at stopping places and at the end of the trip. Among fumigants certain preparations of hydrocyanic acid (HCN) give the best results, and the use of "discoids" (discs of unglazed paper soaked with liquid HCN) or "Zyklon" (fuller's earth similarly impregnated) is recommended; in both forms it can be employed easily and without danger, according to the method described, by a skilled fumigator. Half an ounce of HCN per 1,000 cubic feet may be regarded as the maximal dose for the killing of mosquitoes, but stronger concentrations may be used, especially when it is desired to destroy rodents, and also insects such as cockroaches and flies.

Carboxide, a gas containing 1 part of ethylene oxide and 9 parts of carbonic acid, is likewise efficacious, but less so than HCN, and is slightly toxic to man.

The most effective spraying fluids, the necessary properties of which are discussed at some length, are those containing a good strong extract of pyrethrum, usually dissolved in some form of petroleum. A concentrated and standardized extract of this kind, known commercially as "Pyroicide 40," consists of 4.3 gm. of pyrethrin (the active principle of pyrethrum flowers, obtained by means of ethylene dichloride) dissolved in 100 cc. of mineral oil of the kerosene type. For use, a 4 per cent. dilution of Pyroicide 40 in mineral spirit, or a mixture of 1 gallon of concentrated extract of pyrethrum and 7 gallons of commercial "water white kerosene" is employed, without interfering in any way with the comfort of passengers, or affecting the working of the machine.

E. E. Austen.

WILLIAMS (C. L.) & DREESEN (W. C.). **The Destruction of Mosquitoes in Airplanes. A Preliminary Note.**—*Public Health. Rep.* 1935. May 17. Vol. 50. No. 20. pp. 663-671.

The fundamental problem with which this paper is concerned is the prevention of the spread of yellow fever by aerial travel. For the destruction of mosquitoes in aeroplanes by means of a fumigant, the latter, since it may have to be employed *en route*, must be light, rapid and certain in action, and innocuous to human beings. In a series of experiments the authors tested the effect on *Aedes aegypti* of carboxide

(1 part ethylene oxide + 9 parts carbon dioxide) and of pyrethrum extract.

For more than one reason, including the weight of the necessary container, carboxide proved unsatisfactory, but :—"A concentrated oil extract of pyrethrum flowers containing 2 grams of pyrethrins per 100 cc. is highly effective against *Aedes aegypti* when brought in contact with them in the form of a very fine spray, the lethal concentration apparently being somewhere between 2 and 4 grams per 1,000 cubic feet." Such a spray, in view of the small amount required, is suitable for use in a moving plane, and is believed to be harmless to human beings. Mosquitoes fumigated therewith do not immediately die; whether they are able to bite before expiring remains to be proved.

E. E. A.

WILLIAMS (C. L.) & DREESSEN (W. C.). **A Nonflammable Pyrethrum Spray for Use in Airplanes.**—*Public Health Rep.* 1935. Oct. 11. Vol. 50. No. 41. pp. 1401-1404. [Summary appears also in *Bulletin of Hygiene.*]

The development of international travel by air has increased the risk of the spread of yellow fever, and if this is to be prevented without serious delay to aircraft it is essential to find a means of killing mosquitoes in aeroplanes in flight without danger to the passengers or crew.

A solution of 2 gm. pyrethrins in 100 cc. of kerosene delivered in a fine spray to the amount of 2-4 gm. per 1,000 cubic feet is effective but inflammable. Experiments were therefore made with non-inflammable mixtures. Of a 2 per cent. solution of pyrethrins in carbon-tetrachloride 40 to 60 cc. per 1,000 cubic feet were required to kill *Aedes aegypti*, but this caused irritation of the nose and throat, dizziness, faintness and headache in persons exposed to its effects. Mixtures of 2 per cent. pyrethrins in kerosene and 2 per cent. pyrethrins in carbon-tetrachloride were next tried, and it was found that a mixture of 1 part of the former with 4 of the latter killed 100 per cent. of *Aedes aegypti* in five minutes, when sprayed in amounts of 5 cc. per 1,000 cubic feet. This mixture proved by ordinary tests to be non-inflammable.

Later experiments showed that a mixture of 1 part of solution of 2 per cent. pyrethrins in kerosene and 4 parts of carbon-tetrachloride without pyrethrins gave equally good results, all *Aedes aegypti* being killed by 5 minutes' exposure to a concentration of 5 cc. per 1,000 cubic feet. The mixture appears to be non-inflammable and to cause no inconvenience to persons exposed to concentrations of 10 cc. per 1,000 cubic feet for 15 minutes. The fact that it was so efficient in spite of the fact that it contained not more than 0.4 per cent. pyrethrins caused some surprise, but it was subsequently shown that a kerosene extract containing 0.4 per cent. pyrethrins is about as effective against *Aedes aegypti* as one containing 2 per cent. of pyrethrins.

Chas. F. White.

TREILLARD (M.). Tableau synoptique pour la détermination rapide de toutes les espèces du sous-genre *Stegomyia*. [**Synoptic Table for the Rapid Determination of the Species of the Sub-Genus *Stegomyia*.**—*Bull. Soc. Path. Exot.* 1935. Apr. 10. Vol. 28. No. 4. pp. 291-292. With 1 folding fig.

This is an attempt at simplifying the recognition of species belonging to the subgenus *Stegomyia* in all parts of the world. It consists of a

synoptic figure and not a dichotomous key. The arrangement is very easy to use ; and it reveals very clearly the geographical distribution of the various species. But there are insects belonging to other subgenera of *Aedes* (notably *Finlaya*) which the inexpert is very liable to put into *Stegomyia* and so to arrive at quite wrong diagnosis. The characters of the subgenus are not given. V. B. Wigglesworth.

GIL COLLADO (J.). Nuevos datos sobre la distribución del *Aedes* (*stegomyia*) *vittatus* en España con algunas notas acerca de su biología. [*Aedes vittatus* : its Biology and Distribution in Spain.]—*Medicina Paises Cálidos*. Madrid. 1935. Jan. Vol. 8. No. 1. pp. 61-64. [11 refs.]

All the specimens of *Aedes vittatus* captured, whether larval or adult, were found during the latter half of September and the whole of October, which is probably therefore the time of its greatest activity. In contrast with *Aedes aegypti* it does not hide in human dwellings and in the Province of Cáceres and even more in that of Salamanca the nearest houses were a long way from the place of capture. Other specimens were sent from the swampy region of Cijara in Badajoz Province.

The breeding sites were most commonly hollows in rocks, nearly always quite small but relatively deep, as if the females had chosen collections of water with small surface in relation to volume to guard against drying up and evaporation. These foci did not contain growing vegetation, but were often of a dark, almost coffee, colour from the quantity of decomposing matter. They are found at various altitudes, e.g., at La Fregeneda and Alcolea about 1,000 metres and at Guijo (900) and La Granja (1,100). The distances separating these places indicate that this species is more widely spread than is generally believed.

H. H. S.

EVANS (A. M.) & WALKER (G. R.). Notes on Brazilian Mosquitoes : Species observed in the Amazon Valley, and Record of *Aedes albifasciatus* Macq. invading a Ship in Harbour.—*Ann. Trop. Med. & Parasit.* 1935. Dec. 18. Vol. 29. No. 4. pp. 463-467. With 1 fig.

RELAPSING FEVER AND OTHER SPIROCHAETOSSES.

KEMP (Hardy A.), MOURSUND (W. H.) & WRIGHT (H. E.). **Relapsing Fever in Texas. V. A Survey of the Epidemiology and Clinical Manifestations of the Disease as it occurs in Texas.**—*Amer. Jl. Trop. Med.* 1935. Sept. Vol. 15. No. 5. pp. 495-506. With 3 figs.

A detailed study of the subject based largely on the co-operation of over 600 Texas physicians from all parts of the State, who sent replies to a carefully worded questionnaire.

The results indicate that during 1930 to 1934 inclusive there were 258 reported cases of relapsing fever in Texas. Spirochaetes were found in 80 of these patients, and in the others the diagnosis seems well established by clinical symptoms and by the specific response to anti-spirochaetal treatment. Practically all these cases occurred amongst farm and ranch people, the exceptions among city dwellers being those who might have acquired the disease during some trip to rural districts. The seasonal incidence, late summer and autumn, coincides with the activity of *Ornithodoros turicata* and the disease is restricted to tick-infested localities within a given district.

The symptoms of the disease include a very sudden onset during which the temperature may rise to 105° or 106°F. In the absence of treatment there is little or no abatement in temperature during the next three relapses, after which they become less severe. The length of the afebrile period is irregular in severe cases, but in others is often 4 to 5 days. A macular rash is present in about half the cases but there seems no correlation between this and the severity of the disease. Splenic enlargement and tenderness are common. Liver enlargement is infrequent and jaundice rather uncommon. The only common sequelæ were myalgia and a stubborn muscular asthenia. The infections were often cured by single doses of 0.01 gm. per kilo body weight of neosalvarsan. No fatal cases were reported. *E. Hindle.*

HERMS (W. B.) & WHEELER (C. M.). **Tick Transmission of California Relapsing Fever.**—*Jl. Econom. Entom.* 1935. Dec. Vol. 28. No. 6. pp. 846-855. With 1 fig. [16 refs.]

A general review of the subject, including a brief survey of the five species of the ticks of the genus *Ornithodoros* occurring in California, viz., *O. coriaceus*, *O. turicata*, *O. talaje*, *O. (Otobius) megnini* and *O. hermsi*, followed by the results of laboratory investigations on the tick transmission of the Californian strain of relapsing fever.

Attempts to transmit this strain from infected to normal white mice by the bites of both nymphs and adults of *Ornithodoros coriaceus* gave negative results. Similar negative results, with one doubtful exception, were also obtained by the inoculation of the ground-up contents of these ticks into normal mice. With *Ornithodoros hermsi*, a total of 39 feeding tests conducted on white mice resulted in 11 positive transmissions, with both adult and late nymphal stages. Moreover, as previously noted [*ante*, p. 55], this species has been definitely proved to be infective in nature in the neighbourhood of Big Bear Lake, California.

Finally, an account is given of the infection with relapsing fever contracted in the field at Packer Lake, Sierra County, by one of the authors (C. M. W.). *E. H.*

HERMS (W. B.) & WHEELER (C. M.). *Ornithodoros hermsi* Wheeler as a Vector of Relapsing Fever in California. [Abstract.]—*Jl. Parasitology*. 1935. Dec. Vol. 21. No. 6. p. 440.

"This new species of tick is found at elevations ranging from about 5,000 to 8,000 feet in California and is commonly found in the nests of chipmunks, proven reservoirs of the spirochaete of relapsing fever. Ticks taken in nature in cottages where cases have occurred when allowed to bite white mice transmitted the spirochaetes. Transmission is effected by the bite of both female and male ticks and in all instars, spirochaetes being observed in the blood of white mice usually about 5 days after the infective bite. A small percentage, probably less than fifteen per cent. of the offspring of infective females are able to transmit the disease, thus proving hereditary transmission. When clean ticks are fed on experimentally inoculated mice, the percentage of ticks becoming infective appears to be about thirty per cent., based on rather meagre experimental data. *Ornithodoros hermsi* deposits well over 200 eggs in a given season, from May to October. The incubation period ranges from 15 to 21 days at a temperature of 75°F. and humidity at about 90 per cent. The time required for the several instars depends on the opportunity to feed. After each feeding, requiring about 15 minutes, occasionally as long as 30 minutes, there is a moult, maturity being reached after the fifth including the first which is effected before hatching. The cycle from egg to egg under optimum conditions requires about four months."

WHEELER (Charles M.). A New Species of Tick which is a Vector of Relapsing Fever in California.—*Amer. Jl. Trop. Med.* 1935. July. Vol. 15. No. 4. pp. 435-438.

SERGEANT (André) & LÉVY (H.). Spirochétose hispano-africaine chez un homme piqué par une tique du chien (*Rhipicephalus sanguineus*). [Spanish-African Relapsing Fever in a Man Bitten by a Dog Tick (*R. sanguineus*).]—*Bull. Soc. Path. Exot.* 1935. Nov. 13. Vol. 28. No. 9. pp. 789-790.

The record of a case of relapsing fever in Algeria, in which the patient developed the attack 18 days after having been bitten by a dog tick, *Rhipicephalus sanguineus*.

The spirochaete was isolated by inoculating the patient's blood into guineapigs and found to be *Spirochaeta hispanica*, the third case of this infection in Algeria that has been confirmed by laboratory examination. The general evidence supports the view that the dog tick was responsible for the infection.

E. H.

CANO (Martin) & PASCUAL (Alonso). Un caso de iridociclitis por fiebre recurrente española.—*Medicina Paises Cálidos*. Madrid. 1935. May. Vol. 8. No. 5. pp. 247-248.

MEDULLA (Candido). Sulla dibattuta questione della presenza della ricorrente da *Spirochaeta duttoni* in Cirenaica. [On the Disputed Question of the Existence of Relapsing Fever in Cyrenaica.]—*Arch. Ital. Sci. Med. Colon.* 1935. Oct. Vol. 16. No. 10. pp. 755-759. With 2 figs.

The following account should remove the question beyond the realm of dispute. A man living in Apollonia (Cyrenaica) was bitten on the

left arm by a tick (? *O. savignyi*) and a few days later fell sick with shivering, intense headache, general pains, temperature 39.4°C., palpable spleen, occasional bilious vomiting. Examination of the blood showed numerous spirochaetes. He was treated with neoiacol and recovered.

The doctor who gave the injection accidentally pricked himself with the syringe which was soiled with blood from this patient. In spite of local application of antiseptic, he was attacked 5 days later and showed the same symptoms as those above. Examination of his blood was also positive for spirochaetes. Neoiacol, 0.2 gm. intramuscularly on alternate days and later 0.3 gm. with two-day intervals effected a cure.

H. H. S.

MEDULLA (Candido). Nuovo contributo allo studio della febbre ricorrente in Cirenaica. [**Further Case of Relapsing Fever in Cyrenaica.**]—*Arch. Ital. Sci. Med. Colon.* 1935. Aug. 1. Vol. 16. No. 8. pp. 610–615. With 3 charts & 1 fig. English summary (3 lines).

The author recorded cases of relapsing fever on former occasions in Cyrenaica [see this *Bulletin*, 1934, Vol. 31, p. 853] and now describes three more. A noteworthy point is that in two of them facial paralysis developed, one 12 days after a febrile access, the other on the next day after. In the latter there was also paralysis of the hypoglossal nerve. [The first may have been a coincidence, since the interval was of some length, but the condition is one to look out for; it may be a more frequent complication or sequela than is generally believed.]

H. H. S.

LATYCHEV (N.). Découverte des spirochètes pathogènes pour l'homme chez les rongeurs sauvages dans la vallée de la rivière Mourgab (Turkménie). [**Spirochaetes Pathogenic for Man discovered in Wild Rodents of the Mourgab Valley, Turkmenistan, U.S.S.R.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 5. [In Russian pp. 417–420. With 3 figs. French summary p. 420.]

The author examined wild rodents, *Rhombomys opimus* (? Sand-eel), inhabiting the mountain slopes and valleys near the River Mourgab by Tachta-Bazar, Turkmenistan, and in more than 12 per cent. of them he found spirochaetes in the blood. Inoculation of this blood into the skin [of the author himself?] resulted in an attack of relapsing fever after an incubation period of 14 days; there were 9 attacks of fever [the length of the apyrexial periods are not stated in the French summary from which this abstract is made] accompanied by enlargement of the spleen. In each of the recurrences of fever the spirochaetes were present but only in the early days of the afebrile intervals. These spirochaetes were found also in 5 per cent. of the local bats, *Rhinophus* sp. [In the French summary there is no statement as to the identity of the spirochaetes; from the relapsing character of the infection one would expect *Spirillum minus* of rat-bite fever. *Spirochaeta icterohaemorrhagiae* and *Spirochaeta hebdomadis* do not cause a series of febrile attacks such as are mentioned in the summary.]

H. H. S.

LEPTOSPIROSIS.

- i. MOLLARET (Pierre) & ERBER (Berthe). A propos du diagnostic microbiologique de la spirochétose méningée pure. [**The Microbiological Diagnosis of Simple Spirochaetal Meningitis.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1935. Dec. 9. 51st Year. 3rd Ser. No. 31. pp. 1632–1637.
- ii ——— & ———. Contribution à l'étude physio-pathologique de la spirochétose méningée pure. [**A Contribution to the Pathology and Physical Signs of Simple Spirochaetal Meningitis.**]—*Ibid.* pp. 1638–1643. With 1 chart.

i. The authors call attention to the relative frequency of cases of simple meningitic forms of spirochaetal jaundice, for during 1935 about a score of such cases were diagnosed at the Pasteur Institute in Paris.

Sero-diagnostic methods are recommended as the simplest and most effective means of recognizing these meningitic cases and examples are given of the results of serum tests on three such infections in children. The results are given below in tabular form and show that the meningitic type is not specially associated with water strains.

	<i>S. icterohaemorrhagiae</i> (Verdun Strain)	<i>S. hebdomadis</i>	<i>S. autumnalis</i> A.	<i>S. autumnalis</i> B	Rachmat Strain (India)	<i>Lept canicola</i> (Utrecht IV)	Water strains		
							Erlangen	Tokio	Vinzent
M	1/100,000	0	1/10	0	1/100	1/50	1/10	1/10	0
B	1/5,000,000	0	0	0	1/10	1/10,000	1/50	1/50	1/10
Br.	1/5,000,000	0	0	0	1/100	1/100	1/100	1/500	1/10

ii. An examination of the cerebrospinal fluid of the above mentioned cases showed that antibodies were absent even though all three were typical cases of simple spirochaetal meningitis. In a discussion of the problem it is insisted that by physical signs there is no means of distinguishing between the meningitic reactions in cases of simple spirochaetal jaundice and those of simple spirochaetal meningitis. There are the same modifications in the cerebrospinal fluid, the same discrepancies between the agglutination titre of the blood and cerebrospinal fluid, and also the same impermeability to tuchsin as tested in a baboon, inoculated by means of lumbar puncture with 1 cc. of a culture of *S. icterohaemorrhagiae*.

This symptom is not considered to indicate any special type of infection or any particular strain of spirochaete, but merely another clinical feature of ordinary spirochaetal jaundice, which may or may not be present.

E. Hindle.

MARIE (Julien) & GABRIEL (Pierre). La méningite spirochétosique épidémique chez l'enfant. [**Spirochaetal Meningitis Epidemic in Children.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1935. Nov. 18. 51st Year. 3rd Ser. No. 28. pp. 1454–1465.

A detailed description of three cases of meningitis occurring in children, due to infection with *S. icterohaemorrhagiae*. The patients were

aged 10, 12 and 13 years, respectively, and this seems to be the first record of spirochaetal meningitis assuming an epidemic character in children. The cases occurred during August and September, and it is suggested that bathing may have been responsible for the infection. The symptoms were an acute febrile meningitis, with a sudden onset. The cerebrospinal fluid showed a marked cellular reaction which persisted for about four weeks, whilst there was only a slight rise in albumin, which returned to the normal by the tenth day. All three patients recovered in a few days without any sequelae and without having shown any jaundice.

There was no certain clinical sign indicating the spirochaetal nature of the disease, and this was only detected by obtaining positive sero-diagnostic tests and also by infecting guineapigs by the inoculation of urine from one of the patients.

The disease is probably more widespread than these few records would suggest and acute meningitic cases in children, especially during the summer, should be examined both serologically and by the inoculation of urine into guineapigs. E. H.

GUILLAIN (Georges) & LEREBoullet (Jean). Spirochétose méningée pure à forme mentale. [**A Mental Form of Simple Spirochaetal Meningitis.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1935. Nov. 18. 51st Year. 3rd Ser. No. 28. pp. 1509–1512.]

The description of an epileptic patient who in the course of one of his attacks fell into the Seine and subsequently developed a state of torpor associated with asthenia and amnesia and accompanied by fever.

Serodiagnostic tests confirmed the view that this patient became infected with a simple meningitic form of spirochaetosis after immersion in the river, and the psychic troubles seem to have been connected with the infection, since they disappeared completely as soon as the patient had recovered from the spirochaetal infection. E. H.

LABBÉ (M.), BOULIN, UHRY & ULLMAN. Sur un cas de spirochétose ictérique accompagnée de paraplégie. [**A Case of Spirochaetal Jaundice accompanied by Paraplegia.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1935. Nov. 18. 51st Year. 3rd Ser. No. 28. pp. 1504–1509. [16 refs.]

The description of a fatal case of infection with *S. icterohaemorrhagiae* which showed typical symptoms of severe jaundice and nephritis, accompanied by paraplegia.

The main interest of this case lies in whether the spirochaetes were responsible for the neurological syndrome, and after considering previous records in Japan, together with the severity of the case and the early infectivity of the urine (on the 7th day), the author concludes that the spirochaete probably was responsible for the development of the paraplegia. E. H.

MOLLARET (Pierre) & FERROIR (Jean). A propos de deux observations de spirochétose ictéro-hémorragique dont une avec myocardite mortelle. Contribution à l'étude de la réaction méningée des formes typiques ictériques. [**Two Cases of Spirochaetal**

Jaundice, one with Fatal Myocarditis. A Study of the Meningitic Reaction in Typically Jaundiced Cases.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1935. Dec. 9. 51st Year. 3rd Ser. No. 31. pp. 1622–1631. With 5 figs.

A detailed account of two cases of infection with spirochaetal jaundice in Paris, both of which showed distinct meningitic reactions, in one case evidenced by the clinical symptoms and in the other by modifications in the cerebrospinal fluid.

This relative independence between the clinical signs and changes in the fluid seems to be an important feature of this type of infection. It is associated with a predominance of cytological modifications rather than albuminorachia and also with characteristic changes in the colloidal benzoin reaction.

The various modifications in the cerebrospinal fluid in some cases seem to be merely a reflexion of the changes in the blood, and meningitic symptoms may occur almost without the development of antibodies in the subarachnoid region. E. H.

MARCHAL (Georges), SOULIE (P.) & ROY (A.). Spirochétose ictéro-hémorragique. Troubles cardiaques et modifications électrocardiographiques. [**Spirochaetal Jaundice. Cardiac Symptoms and Electrocardiographic Changes.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1935. Dec. 9. 51st Year. 3rd Ser. No. 31. pp. 1651–1654.

A description of a case of infection with *S. icterohaemorrhagiae*, in which the patient showed symptoms of myocarditis, which were also recognized by examination with the electrocardiograph. E. H.

KOURILSKY (Raoul) & MAMOU (H.). Les formes "pseudogrippales" de la spirochétose anictérique. [**Forms of Spirochaetal Infection without Jaundice simulating Influenza.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1935. Nov. 18. 51st Year. 3rd Ser. No. 28. pp. 1514–1519.

The description of two cases of infection with *S. icterohaemorrhagiae*, identified by sero-diagnostic tests, neither of which showed any jaundice or meningitis, but symptoms suggesting influenza, such as fever and backache, accompanied by redness of the pharynx, erythematous stomatitis, etc.

Both the patients were in the habit of river bathing and the infections occurred in the summer, and in view of the many atypical forms of this disease, the authors are of the opinion that cases of "influenza" occurring in the summer should be viewed with suspicion as possible atypical forms of spirochaetal jaundice. E. H.

TROISIER (Jean), BARIÉTY (Maurice) & MACREZ (Cl.). Spirochétose ictéro-hémorragique fébrile pure [Leptospirose fébrile pure]. [**Simple Febrile Spirochaetal Jaundice (Simple Febrile Leptospirosis).**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1935. Nov. 18. 51st Year. 3rd Ser. No. 28. pp. 1465–1470. With 1 chart.

The description of the case of a patient who apart from a severe injection of the conjunctivae, showed no other clinical symptoms except a typical febrile syndrome. There was no trace of jaundice, haemorrhages, nor any meningitic syndrome, but the inoculation of the

cerebrospinal fluid, collected on the 6th day, into a guineapig resulted in the production of a typical and fatal infection with *S. icterohaemorrhagiae*. Serodiagnostic tests of the patient's blood were negative on the 6th day, but were positive on the 12th day. E. H.

CAIN (André), CATTAN (Roger) & BENSUADE (Alfred). Trois cas atypiques de spirochétose ictéro-hémorragique. [**Three Atypical Cases of Spirochaetal Jaundice.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1935. Nov. 18. 51st Year. 3rd Ser. No. 28. pp. 1470–1475.

The description of three cases of infection with *S. icterohaemorrhagiae*, the first simulating catarrhal jaundice, the second a pseudo-typhoid, and the third showing hardly any definite clinical symptoms, beyond three to four days of fever, accompanied by certain digestive troubles.

Injection of the conjunctivae was a constant feature, and all three patients were in the habit of bathing in the river. The nature of the infection was determined by obtaining positive serodiagnostic tests.

E. H.

SABRAZÈS (J.), LANNELONGUE (G.), DUTRÉNIT (Jean) & BONNEL. Forme anémique et subictérique de la spirochétose d'Inada-Ido. [**An Anaemic and Sub-icteric Variety of Spirochaetal Jaundice.**]—*Gaz. hebdom. Sci. Méd. de Bordeaux*. 1935. Dec. 22. Vol. 56. No. 51. pp. 807–810.

A description of a case in which during the first 10 days of the infection the number of red cells diminished to a half, accompanied by leucocytosis and considerable arterial hypotension. This was followed by the development of febrile symptoms and jaundice which gradually subsided, but the anaemia has persisted with oscillations for more than four months, without any haemorrhages except slight epistaxis at the beginning of the fever. E. H.

HASLE (G.), TOULLEC (F.) & VAUCEL (M.). Spirochétose ictéro-hémorragique et spirochètoses anictériques observées à Hanoi. [**Spirochaetoses with Haemorrhagic Jaundice and also without Jaundice observed in Hanoi.**]—*Bull. Soc. Méd.-Chirurg. Indochine*. 1935. May. Vol. 13. No. 4. pp. 407–428. With 8 charts.

The authors give a detailed account of 5 cases of typical Weil's disease observed in Hanoi, and then 7 cases in which the clinical symptoms, including the absence of jaundice, separated them off from the preceding. As a result mainly of agglutination tests, this second group of cases would seem to belong to the seven-day fever and autumnal fever caused by *S. hebdomadis*. E. H.

CAROLI (Jacques). Un cas d'azotémie fébrile spirochètosique. [**A Case of Febrile Spirochaetosis with Azotaemia.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1935. Nov. 18. 51st Year. 3rd Ser. No. 28. pp. 1513–1514.

The description of the case of a patient, a river bather, who became infected with *S. icterohaemorrhagiae*, as detected by serodiagnosis, but showed merely febrile symptoms accompanied by azotaemia, which returned to normal by the 12th day. E. H.

MASSIAS (Charles). Un cas mortel de spirochétose ictérique à Travinh (Cochinchine). [**A Fatal Case of Spirochaetal Jaundice at Travinh (Cochin China).**—*Bull. Soc. Méd.-Chirurg. Indochine*. 1935. July-Aug. Vol. 13. No. 6. pp. 788-790.]

The record of a case of spirochaetal jaundice in an Annamite with typical clinical symptoms, who died on the 7th day of illness. Sero-agglutination and lysis tests were positive for *S. icterohaemorrhagiae*.

E. H.

MASSIAS (C.). Un nouveau cas mortel de spirochétose ictérique en Cochinchine avec autopsie. [**An Additional Fatal Case of Spirochaetal Jaundice in Cochin China with Autopsy.**—*Bull. Soc. Path. Exot.* 1935. Nov. 13. Vol. 28. No. 9. pp. 791-792.]

The description of a typical case of spirochaetal jaundice in an Annamite, in which the diagnosis was confirmed by the results of autopsy and also by serum-agglutination tests. [See above.]

E. H.

RAGIOT (Ch.), DELBOVE (P.), NGUYEN-VAN-HUONG & HO-THIEU-NGAN. Nouvelle note sur la spirochétose ictérique en Cochinchine. [**An Additional Note on Spirochaetal Jaundice in Cochin China.**—*Bull. Soc. Méd.-Chirurg. Indochine*. 1935. Sept. Vol. 13. No. 7. pp. 817-824.]

Clinical observations on five cases of this disease occurring in Cochin China, where the symptoms show the same wide range of variation as in other parts of the world. In four cases the diagnosis was confirmed by blood inoculations into guineapigs and in the fifth by agglutination tests.

E. H.

WIGMORE (J. B. A.) & DENNING (G. M.). **Leptospiral Jaundice in a Groom.**—*Jl. Roy. Army Med. Corps*. 1936. Jan. Vol. 66. No. 1. pp. 21-26. With 1 chart.

The record of a case in which the infection was almost certainly acquired from a rat by contamination with its blood. Seven days before the onset, the patient was slightly bitten on the finger by a dog that had just killed a rat. The symptoms of the disease were typical and spirochaetes were found in the urine.

E. H.

BERZI (A.) *Forme clinica di spirochetosi ittero-emorragica.*—*Sperimentale*. 1935. Aug.-Oct. Vol. 89. No. 4-5. pp. 535-554. [42 refs.] English summary (10 lines).

ERBER (Berthe). Sérodiagnostic, par agglutination, de la spirochétose ictérohémmorragique. Technique et interprétation. [**The Serum Diagnosis, by Agglutination, of Spirochaetal Jaundice. The Method and its Interpretation.**—*C. R. Soc. Biol.* 1935. Vol. 120. No. 34. pp. 618-622.]

Details of the methods used at the Pasteur Institute, Paris, by the author, who has been for many years in charge of the examination of the specimens sent in for sero-diagnosis in cases of suspected spirochaetal jaundice.

A 4-day old culture of the living spirochaete in 20 per cent. rabbit serum in saline was generally used, and it is necessary to examine it by

the dark-ground to see that active spirochaetes are present. If older cultures are used they should be centrifuged for a short time to remove any débris from the medium. The patient's serum should be fresh and clear and when examining cerebrospinal fluid no traces of blood should be present.

For the test three tubes are used: the first receives 0.1 cc. of the undiluted serum, the second 0.1 cc. of the serum diluted 1 : 10, and the third 0.1 cc. diluted 1 : 100; 0.9 cc. of culture is added to each of the tubes and also to a fourth tube, which receives 0.1 cc. of saline and serves as a control. The tubes are kept at 37°C. for one hour before examination. With cerebrospinal fluid, dilutions of 1 : 10, 1 : 50 and 1 : 100 are used. As a rule this test is sufficient to indicate whether the specimen is positive or negative, but in some cases the titre of the serum is of interest and then dilutions up to 1 : 100,000 or more are prepared.

Examination is always made by means of dark-ground illumination using a No. 6 objective and No. 4 eyepiece. With positive sera, dilutions of 1 : 10 generally contain free spirochaetes, but their movements are feeble; in addition there are a few spirochaetes agglutinated in irregular masses. In the 1 : 100 dilutions, there are free spirochaetes and also more or less spherical masses covered with feebly motile spirochaetes undergoing lysis. In the 1 : 1,000 dilution, there are numerous small masses of agglutinating spirochaetes, somewhat resembling the appearance of red blood cells in a hypertonic solution; usually no free spirochaetes are present. If the spirochaetes remain active, even if they agglutinate in the lower dilution, the reaction is doubtful and if a second test with serum collected a few days later gives similar results, it must be regarded as negative.

Agglutination may be observed commonly in dilutions up to 1 : 100,000: but lysis soon disappears in dilutions above 1 : 1,000.

With cerebrospinal fluid doubtful reactions have not been observed since the limit of dilution rarely exceeds 1 : 100, even when the serum of the patient agglutinates in dilutions of 1 : 100,000. E. H.

VERGE (J.). Les spirochètoses du chien. [**Dog Spirochaetoses.**]—*Rev. Gén. de Méd. Vét.* 1935. Dec. 15. Vol. 44. No. 528. pp. 705-711.

A brief summary of the supposed spirochaetal infections of the dog including *S. canina*; Stuttgart disease, or haemorrhagic gastro-enteritis, stated to be due to *S. melaenogenes canis*; canine leptospirosis including two strains, *Leptospira icterohaemorrhagiae* and *L. canicola*; and finally infections of fusiform bacilli and spirochaetes.

E. H.

RAT-BITE FEVER.

CHODZKO (W.). Les premiers cas de sodoku observés en Pologne et en Lithuanie. [**The First Cases of Sodoku observed in Poland and Lithuania.**]—*Bull. Office Internat. d'Hyg. Publique.* 1935. Sept. Vol. 27. No. 9. pp. 1769-1773.

A case of this disease was observed by CZYZEWSKI and BROSS in Poland in 1931, and in addition to a description of this case, the author

also gives an account of three more examples of the disease in Lithuania. The clinical symptoms, pathological findings and treatment were typical. *E. Hindle.*

MÜLLER (Kurt L.). Ein Fall von japanischer Rattenbisskrankheit (Sodoku) in Oberösterreich. [**A Case of Japanese Rat Bite Fever (Sodoku) in Upper Austria.**—*Wien. Klin. Woch.* 1935. Nov. 22. Vol. 48. No. 47. pp. 1449-1450.]

The description of a typical case of rat-bite fever in an Austrian farm servant. The diagnosis was confirmed by inoculation into a guineapig, which showed *S. minus* in its blood. The patient was cured by injections of neosalvarsan, starting with a dose of 0.3 gm., gradually rising on the 8th day to a dose of 0.9 gm., and the author considers that a total of at least 3 gm. should be used in order to avoid any relapses. *E. H.*

TALEC. Sur un nouveau cas de sodoku à Pondichéry. [**A Case of Rat-Bite Fever in Pondichéry.**—*Ann. de Méd. et de Pharm. Colon.* 1935. July-Aug.-Sept. Vol. 33. No. 3. pp. 838-840.]

A woman of 37 years passed through a normal parturition. Three days later she had a rise of temperature and complained of stabbing pain in the right shoulder, which was a little swollen and showed inflamed lymphatics running towards the clavicle and axilla, and a small ulcer in the middle of the swelling. A history was obtained that eight days before coming to hospital, *i.e.*, 11 days previous to the onset of symptoms, she had been bitten by a rat; the wound had healed in 3 days. The fever dropped and the general condition improved after two injections of sulpharsenol and the patient left hospital 14 days after her admission. Three weeks later she had a return of the pain and repeated chills with rise of temperature. She was given 3 injections of Uclarsyl [? composition], 0.15, 0.3 and 0.4 gm. the last two at 4 and 6 days' interval and the symptoms cleared up. She was a nurse at the hospital and has thus been under observation, but so far there has been no further relapse. [There is no statement as to finding or even looking for the spirillum.] *H. H. S.*

BENESTAD (Gunnar). Et tilfelle av rottebittsykdom.—*Norsk Mag. f. Laegevidenskapen*. 1935. July. Vol. 96. No. 7. pp. 729-734. With 2 figs. [10 refs.] English summary.

PLAGUE.

BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1935. Sept. Vol. 27. Supplement to No. 9. 67 pp. With 1 fig. & 2 folding maps. (5 bibliographies.)—La peste africaine [JORGE (Ricardo)]. [Plague in Africa.]

This is a valuable monograph, not only for those concerned with plague in one or other part of the African continent, but for students of plague in general. It contains chapters on ancient history, geographical distribution, statistics, vectors, clinical plague and prophylaxis together with two useful maps of the invasions, epidemiological situation and predominant pestigenic rodents in Africa. Much the most interesting chapter, however, is that with the full name of "The pestigenic vectors, rodents and fleas. Common plague and selvatic plague. The rat the flea and man in African plague. Interhuman transmission. The free flea. Zoological map."

Plague is in reality the work of two rats—*Epimys norvegicus* the brown rat, and *Epimys rattus*, the black rat. Whereas the brown rat remains true to type the black rat shows many variations and the variants, such as the *alexandrinus* of Egypt, the *kijabius* of Uganda and the *frugivorus* or *tectorum*, may be more numerous than the type. The two main rat types are domestic rats but can become rural on occasion. By far the most important of the rat fleas is the *Xenopsylla cheopis*. At the present day fleas are sought for not only on the rodents themselves but as free fleas in rodent burrows, in clothing, and in the midst of grain which is in course of transit.

Rodents which are capable of being infected with plague are divided up into the pestiferous and the pestigenic, according as they are practically concerned or not with the transmission of plague. The common mouse for example is a pestifer, very susceptible of plague, but not ordinarily a transmitter. It is the same with fleas. Not every flea is given the "plague charter." Such a distinction will depend upon its capability of attacking man and of developing the necessary proventricular block whereby plague bacilli can be discharged into its skin puncture.

A special place is accorded in Africa and especially South Africa to the plague of the hinterland. Whereas the brown and the black rat are predominantly responsible for the plague of the ports and coast, the former for the north of Africa and the latter for the remainder of the continental littoral, "there is a certain type of plague for which the zoological and geographical origin is different. This plague is not the work of domestic but of wild rodents; it rages not in the inhabited parts of the country but in the uninhabited and as an epizootic." This has been named by Dr. Jorge "selvatic plague." In South Africa the author of this type of plague is the gerbil, *Tatera lobengulæ*. By contact of the rat *Rhabdomys pumilio* and the multimammate rat, *Mastomys coucha*, with the gerbils a connexion is established between human habitations of the ports and the inland regions, and so plague is brought to the scattered farms of the veld. The persistence of selvatic plague in South Africa is regarded as highly dangerous because of its tendency to spread into other territory. In Northern Africa, the plague of the "bled" of Tunis has been regarded, but somewhat doubtfully, as selvatic and due to merions. Further South in that region the *Psammomys roudairei* is predominant, a very susceptible but hitherto unaffected rodent.

Although the sequence, rat-flea-man, is recognized as a necessary one, it is not accepted in its entirety as the only one and the sequence itself may be very long drawn out in time. We have cases presenting themselves in practice of the "epizootic without epidemic" and "epidemic without epizootic." The consideration of these questions leads up to those of interhuman convection and the transmissions of plague by "free fleas." The subject is too lengthy to treat in an abstract, but it may be remarked that the *Pulex irritans* of man, and not the rat flea, may, by reason of its enormous numbers in certain countries such as Morocco, become a plague vector from man to man and that the plague-infected rat flea may itself, by reason of its long life after separation from its host and by its preservation of infectivity for months, become a transmitter of plague.

Dr. Jorge does not seem to show great enthusiasm for vaccination prophylaxis against plague. His hopes of remedy are based mainly on deratization, disinfestation from fleas, rural hygiene, and the march of civilization. Nor is he forgetful of the fact that "plague can efface itself without any intervention."

W. F. Harvey.

UNION OF SOUTH AFRICA. ANNUAL REPORT OF THE DEPARTMENT OF PUBLIC HEALTH FOR YEAR ENDED 30TH JUNE, 1935 [THORNTON (E. N.), Secretary]. [Plague pp. 32-35; Anti-Plague Measures pp. 85-89.]

Plague was a matter of great concern in South Africa during the year under review. The mortality among veldt rodents assumed great proportions and there was considerable incidence among human beings. This had not been altogether unexpected, for during 1933-34 the season had been especially "favourable for the growth of grasses on the seeds of which the gerbille depends for its existence." Waves of plague infection began to make their appearance among these rodents and from them was transmitted to human beings by the main intermediary between the gerbille and man—the multimammate mouse. The number of human cases was greatest in the Orange Free State and amounted to 197 with 141 deaths. The outbreaks of plague were of some advantage because it enabled officials to impress upon local authorities with some success the need for immediate antirodent measures. It has always been difficult, when human cases of plague are absent, to arouse the enthusiasm of the smaller local authorities for "active campaigns particularly in connection with the 'building out' of rodents from stores and dwellings."

In another part of this report reference is made to antiplague measures for railways and harbours. It is pointed out that "the *prevention* of infestation rather than disinfestation is aimed at. This can only be accomplished by a continuous patrol of sections and constant inspection of, and repair to, the rodent proofing of structures." The system of patrolled sections can be very readily changed from one of routine antirodent work to work in affected plague areas "Ratproofing, *i.e.*, building the rat out of railway premises, consists of (a) making natural harbourages such as guttering, roof-ridging and hollow walls impossible. Access to these places is prevented by wire netting and sheet iron, every corrugation and space being attended to. Floors where solid are made of concrete or asphalt and the outsides of foundations are protected with sheets of corrugated

iron to a depth of two feet to prevent access from outside. . . . (b) disinfecting artificial harbourage. Stacks of grain and merchandise are disinfested and turned over at regular periods, old records . . . are being kept elsewhere or tidied and made incapable of harbouring rodents." W. F. H.

ROBERTS (J. Isgaer). **The Relationship of the Cotton Crop to Plague, and its Rôle as a Vehicle for Rats and Fleas in East Africa.**—*Jl. Hygiene*. 1935. Aug. Vol. 35. No. 3. pp. 388–403. With 1 graph.

Some authors have expressed the view that there is a close relation between the transport of cotton seed and the introduction of plague infection. It is this question which the author has investigated, both by definite survey and epidemiological investigation, at Mombasa, which is the main port for the East African Coast, and by definite feeding of rats with cotton seed to determine its attractiveness as a food. He has found that "Mombasa is open to infestation with rats and fleas from up-country districts where plague is endemic but only on one occasion has any suspicion been attached to the carriage of infected fleas or rats." Again it is well known in agricultural circles that young animals, such as sheep and calves, when fed on cotton seed develop anaemia, nephritis and gastroenteritis. On historical grounds also "the evidence is strongly against cotton having any association whatsoever with plague. Plague occurred in East Africa long before the introduction of cotton as a crop. The native populations of both Kenya and Uganda were suffering from a high plague mortality before they had commenced cultivating this crop and to-day in Kenya plague is only endemic in areas where no cotton is being grown." The author's conclusions are :—

"(1) Cotton seed is *not* a rat-attracting foodstuff, nor does it provide a desirable food. (2) Cotton seed up to the time of export, and for some time after, is toxic to the majority of *Rattus rattus*, and when fed solely or when rats are forced through hunger to nibble at small quantities, a large proportion of them is killed. (3) Cereals and vegetables, if present, are always eaten in preference to cotton seed. (4) The cotton-seed export from Kenya and Uganda can be regarded as guiltless in the carriage or dissemination of plague infection, either through the agency of fleas or rats." W. F. H.

HOPKINS (G. H. E.). **Some Observations on the Bionomics of Fleas in East Africa.**—*Parasitology*. 1935. Oct. Vol. 27. No. 4. pp. 480–488.

The paper describes observations on the duration of life of certain stages of fleas under partially controlled laboratory conditions.

The majority of the author's experiments were performed with fleas of unknown age taken direct from a rat which had been trapped. It may therefore be claimed that the experiments indicate how long a flea might live if it moved away from a dead host under natural conditions. The author exposed his insects to three combinations of temperature and humidity, and records the length of life (males and females separately) of *Xenopsylla cheopis* and *brasiliensis*. The data in these and other experiments are fully recorded, the mean length of life and its standard error, also the maximum and minimum, being shown in tables. The author observed that under the conditions of his experiment female fleas laid a small number of eggs, nearly all of them on the first day of the experiment. Eggs and the larvae and pupae which

came from them were subjected to controlled conditions. It appears that neither *X. cheopis* nor *brasiliensis* could be successfully bred through at either 15° or 30°C. At 20°C., in air approaching saturation, it was found that the duration of the larval and pupal stages combined was about 45 days for females and a little longer for males of both species of *Xenopsylla*.

A short series of experiments was also carried out with unfed, recently hatched fleas, the duration of life of which at 20°C. was studied. It is clear that the duration of life was materially longer than that recorded under very similar conditions by LEESON [this *Bulletin*, 1932, Vol. 29, p. 839]. No reason was found to explain this discrepancy which is considerable.

P. A. Buxton.

ROBERTS (J. Isgaer). The Endemicity of Plague in East Africa.—*East African Med. Jl.* 1935. Oct. Vol. 11. No. 7. pp. 200-219.

WILLIAMS (C. L.). History of Bubonic Plague in New Orleans.—*Amer. Jl. Trop. Med.* 1935. Sept. Vol. 15. No. 5. pp. 555-569.

A clear-cut history of plague as it has affected and been eradicated from a sea-port town carries an instructive lesson. Plague did not appear in New Orleans until the facts of its mode of transmission and its mode of suppression were already known. Its history is all comprised within a period of 13 years from the time that the first plague rat was trapped in 1912 to 1925 when the last known plague-infected rat was found.

An active search was made throughout the city for two years after the appearance of the first rat case and not till then did the first human case come to light. Now began "the first human and rodent outbreak," which as a conjunction of epizootic and epidemic came to an end in 1915, and came to an end, so far as infected rats were concerned, in 1917. What is called the "second human and rodent outbreak" occurred in 1919 with its last human case in 1920 and its last infected rat in 1921. A last, purely "rodent infection," originated with the arrival of a ship in the port and the development of a human case on board. Plague on this occasion made its appearance among the dock rats, but no human cases occurred. The last infected rat was found in January 1925 and "to-day there is no doubt that New Orleans is free from plague infection." This is a brief account of the plague history of New Orleans.

The measures taken for suppression of and protection against plague are, naturally, even more interesting than the epidemiology. Three procedures fall to be noticed, described as (1) reduction in the number of rats, (2) separation of rats and human beings, and (3) elimination of foci of infection. Reduction was effected by trapping and poisoning, while separation was accomplished by rat proofing, that is to say by the construction of buildings "so that rats had no places in them in which to harbor and escape from their many enemies. Essentially, there were three methods: one was to elevate the buildings, leaving a clear, open space beneath; the second was to build an impervious wall around the ground floor, penetrating two feet into the ground . . . and extending above the floor level so as to close all openings into the space between the walls; the third, and most effective procedure, was to lay the ground floor in concrete with a protective wall around the edges, sinking two feet into the ground." An idea of the cost of these operations is given by the statement that during the 3 years of the first outbreak more or

less extensive alterations to more than 150,000 buildings involved a cost to the owners of more than 5,250,000 dollars.

Elimination of foci was accomplished by subjecting the area surrounding a point where an infected rat had been found to intensive trapping, fumigation and, in a few special cases, demolition.

Protection against spread of infection to other localities was also attended to. At first freight cars and freight were very carefully inspected, but this was given up as unnecessary. All ships, however, leaving New Orleans "were fumigated to kill rats before departure" and at the present time rat proofing and thorough inspection are applied to ships with most gratifying results. "Today between 80 and 90 per cent. of the ships that visit United States ports are entirely free from rats and the heavily and persistently-infested vessel has become a rarity."

It is hoped and believed that the city of New Orleans will now continue to be free from further plague infection. W. F. H.

PARDAL (Eduardo). Brote de peste pulmonar en Santa Rosa (provincia de San Luis). [**Outbreak of Pneumonic Plague in Santa Rosa (San Luis).**]—*Rev. Inst. Bacteriológ.* Buenos Aires. 1935. Mar. Vol. 6. No. 5. pp. 643-650. With 1 map.

URIARTE (Leopoldo), ARGERICH (Ricardo) & PASSALACQUA (Ricardo). Una epidemia de neumo peste en 1913. [**An Outbreak of Pneumonic Plague in 1913.**]—*Rev. Inst. Bacteriológ.* Buenos Aires. 1935. Mar. Vol. 6. No. 5. pp. 651-660. With 1 map. French summary.

BATTAGLIA (Manuel I.) & URIARTE (Leopoldo). Un brote de neumo peste en Merou (prov. Entre Rios) en 1927. [**An Outbreak of Pneumonic Plague in Merou (Entre Rios).**]—*Rev. Inst. Bacteriológ.* Buenos Aires. 1935. Mar. Vol. 6. No. 5. pp. 661-667. With 1 map. French summary.

All three of these communications illustrate the extreme infectivity and the high fatality rate of pneumonic plague. In the first case the history is of a man who probably developed secondary plague pneumonia and who infected some five contacts. These were a hospital attendant, a hospital cook, his nephew, a dweller in a farm opposite the hospital, and, indirectly, one who had been in contact with the last of these cases.

The second account is of an epidemic, unrecognized at first and diagnosed as influenza or simple pneumonia, which gave rise to 45 deaths in 3 villages; probably all who were attacked died, although some of them were treated by serum. The infection was very strictly limited to a few families and ceased with the segregation of all contacts.

In the third outbreak also there was a high fatality rate. Twenty-three cases of pneumonic plague were all fatal in spite of sero-therapy, and the foci of infection were again limited to members of a family and their attendants. W. F. H.

URIARTE (L.) & CANAL FEIJÓO (E. J.). La neumo peste en algunos puntos de la prov. de Santiago del Estero. [**Pneumonic Plague in Santiago del Estero.**]—*Rev. Inst. Bacteriológ.* Buenos Aires. 1935. July. Vol. 7. No. 1. pp. 42-52. With 1 map & 6 figs. French summary.

A description is given of the occurrence of 11 cases of pneumonic plague in the Argentine province of Santiago del Estero. The first

case was that of a woman who lived in one of those huts called "ranchos," which are commonly constructed for peasants living in the fields. The other members of the family were infected from this case as also were the members of another family who had given help to the first family. All the patients died. The outbreak is an example of the restriction of pneumonic plague to circumscribed foci.

W. F. H.

- i. URIARTE (Leopoldo), MORALES VILLAZON (N.) & ANCHEZAR (Benjamin). Procedimiento para investigar la peste en roedores. [Examination for Plague in Rodents.]-*Folia Biol.* Buenos Aires. 1935. July-Aug.-Sept.-Oct. Nos. 52-53-54-55. pp. 229-230. [French version p. 244.]
- ii. DE LA BARRERA (J. M.) & RIESEL (M.). Epizootia de peste en roedores en La Pampa y Río Negro. [An Epizootic of Plague in the Territories of the Pampas and Río Negro.]-*Ibid.* pp. 230-233.
- iii. SAVINO (Enrique). Peste rural en el Departamento de Leventué (La Pampa). [Rural Plague in Leventué (the Pampas).]-*Ibid.* pp. 233-235.
- iv. DE LA BARRERA (J. M.). Peste en liebre (*Lepus europaeus*, Pallas). [Plague in the Hare.]-*Ibid.* p. 243.

i. The examination of the bone marrow of animals for plague bacilli is strongly recommended, especially if putrefaction has set in. In this way pure cultures can be obtained in hot climates even if the animal material has been 3 or 4 days in transit to the laboratory. It is convenient to despatch the tibia of the animal or, if this is too small, the femur.

ii. The authors give an account of a plague epizootic among guinea-pigs (*Microcavia* and *Galea*), the occurrence of one human case in a child and transmission from guineapig to guineapig by its fleas.

iii. An outbreak of plague is described which was characterized by the occurrence of four human cases in places very far from one another and during an interval of 70 days. No rats of the species *Rattus* and no *X. cheopis* fleas were found. The cause of the plague was apparently traceable to an epizootic among rats of the species *Graomys griseoflavus*, an animal of arboreal habit and almost ubiquitous. The flea index of these animals was 6, and 92 per cent. belonged to the species *Rhopalopsyllus occidentalis*, while the remaining 8 per cent. were *Craneopsylla wolffhuegeli*. A plague infection was also demonstrable in guineapigs of the genus *Galea*.

iv. This account is one of isolated infection of a hare, and is placed on record as not being a common type of animal infection. Such an infection may be of some importance in view of the fact that the hare is not a burrowing animal and can cover considerable distances. Its flesh is used for food and its pelt for sombreros.

W. F. H.

URIARTE (Leopoldo) & MORALES VILLAZÓN (N.). A propósito de peste en roedores agrestes de la Argentina. [Plague and the Rodents of the Country in Argentina.]-*Rev. Inst. Bacteriológ.* Buenos Aires. 1935. Nov. Vol. 7. No. 2. pp. 185-212. With 2 coloured plates & 1 map. English summary.

In the Argentine rodents of the cavy type are numerous. These rodents have suffered from plague epizootics on several occasions, but

only one of these seems to have persisted (see above) in the territory of the Pampas. The species of rodent found infected were the cavies or "cuises," *Microcavia australis* and *Galea*, together with a cricetid *Graomys griseoflavus*, the last of which has been experimentally shown to be very susceptible to plague. Cavies, which are rural in distribution, must have been infected through the rat and once infected become a real danger to man, because of their abundance and the absence of any obstacle to the widespread distribution of an epizootic. Fortunately there is a scarcity of population in the districts affected, scarcely one inhabitant in 10 square kilometres, and only 20 cases of human plague have been registered in 16 years over an area of 30,000 square kilometres.

W. F. H.

SAVINO (Enrique). Peste rural en el departamento de Leventué, territorio de La Pampa. [**Rural Plague in Leventué (the Pampas).**]—*Rev. Inst. Bacteriológ.* Buenos Aires. 1935. July. Vol. 7. No. 1. pp. 141–150. With 8 figs.

The subject of this article has been noted above. The peculiarity of the epizootic was that although widespread over an area of 180 by 70 kilometres there was little or no human plague, a fact ascribed to the arboreal habit of the rat concerned (*Graomys griseoflavus*), which is very different from the domestic character of *Rattus rattus*.

W. F. H.

KELLOGG (W. H.). **Rodent Plague in California.**—*Jl. Amer. Med. Assoc.* 1935. Sept. 14. Vol. 105. No. 11. pp. 856–859.

After a period of quiescence and persistence of moderate enzootic plague [this *Bulletin*, 1934, Vol. 31, p. 878] there has developed in some of the counties of California a well marked ground-squirrel epizootic. It serves, unfortunately, to demonstrate "that the ground squirrel infection not only is not decreasing after thirty years but is, on the contrary, increasing and expanding over a much wider territory. Not only in the Coast Range and the interior valleys but now in the Sierras it is found. The establishment of a permanent endemic rodent focus is thus thoroughly demonstrated." An important point in connexion with the present epizootic is the apparently "increasing pulmonary tendency on the part of the prevailing strain of organism." One of the most characteristic differences between rat and squirrel plague is the presence of nodules and haemorrhages in the lungs in the latter and not in the former. Such pulmonary tendency in the ground squirrel may, it is feared, have relation to the occurrence of the pneumonic form of plague in man.

W. F. H.

MEDEDEELINGEN VAN DEN DIENST DER VOLKSGEZONDHEID IN NEDERLANDSCH-INDIË. 1935. Vol. 24. Supp. to No. 3. pp. 185–348. With 22 graphs, 7 sketch maps & 4 maps. English summary pp. 269–271.—Verslag betreffende de pestbestrijding op Java over het jaar 1933. [**Report on Antiplague Measures for 1933 in Java.**]

The year 1933 saw the outbreak of a severe epidemic of plague in Java. Not only was it severe, but the population of West Java, in which it

occurred, was difficult to deal with and the time was one of great financial stringency. A total mortality of 6,442 in 1932 became increased to 16,881 in 1933 and was distributed as follows:—15,188 in West Java, 1,684 in Central Java, and 8 in East Java. The large mortalities of the epidemics of 1914 (15,156) and 1925 (14,484) were located almost entirely in East Java and East and Central Java respectively. Thus, in the present epidemic visitation, there was no return to the former territory of East Java, and this is ascribed to the good results of the earlier preventive work in that region. The basis of the preventive work has been housing improvement and constant inspection to maintain that improvement. Vaccination, as an antiplague measure, did not take a prominent place in 1933. This was founded upon the opinions expressed by OTTEN on the vaccines of Haffkine and Kolle in 1921–1922, when he obtained unsatisfactory results—a reduction of the mortality only to one half (35,000 vaccinated alternating with 35,000 controls). The report under review, however, refers to 1933 and OTTEN has since then brought forward a vaccine (see below) which he considers sufficiently active to allow of recommendation for mass inoculation. It is a living vaccine with a single dose of 500 million organisms of the avirulent strain Tjiwidej, and is claimed (April 1935) to be capable of reducing plague mortality to 10 per cent.

The reference in this report to the unusual obstinacy of the people of West Java is illustrated by the reception given to the plague staff in their endeavour to establish the diagnosis of plague. A spleen puncture of corpses has been found to be a very certain means to this end, but the population was ignorant and intensely Mohammedan. A spleen puncture was looked on in some districts as a violation of the dead and in others, more animistic, as causative of pain to the soul of the dead. The opposition reached a considerable height and one of the staff was murdered by villagers.

The epidemic was combated in accordance with the general plague policy by a gradual improvement in housing conditions. "The disease disappeared as if by magic from the infected subdistricts as soon as the improvement of housing conditions was taken in hand." W. F. H.

DE VOGEL (W.). Vaccinations antipesteuses avec un virus vivant aux Indes Néerlandaises. [**Anti-Plague Vaccination with Living Organisms in the Netherlands Indies.**]—*Bull. Office Internat. d'Hyg. Publique*. 1935. Aug. Vol. 27. No. 8. pp. 1542–1545.

In this short communication there are illustrated two important methods of procedure: (1) test of efficacy by alternate case data and (2) the use of living instead of dead organisms for protective inoculation. OTTEN had found an avirulent culture of the plague bacillus with which he could strongly immunize such very sensitive animals as *Mus rattus griseiventer* and the guinea pig. The "smooth" variant was alone used as antigen. After obtaining satisfactory results with these animals he inoculated himself with a dose of this living plague corresponding to 1–50th agar culture. Then followed inoculation of 50 Javanese volunteers. Now the vaccination has been extended to the population of whole districts near Bandoeng in Java where plague was raging. Half only of the individuals of each family, divided up so as to be as far as possible comparable in the matter of age, were vaccinated. The actual numbers vaccinated between 2nd November and

6th December were 37,500, which was about half the population of the districts attacked. Deaths occurring among either vaccinated or non-vaccinated in the first week after the vaccination were not included in the mortality results. These are given as from the second week after vaccination for a period of 2 months and amounted to 23 (14.5 per cent.) in the vaccinated and 132 (85.4 per cent.) in the non-vaccinated. Each death in the region under test was investigated and microscopic examination made of the material obtained by lung and spleen puncture. Up to the present 400,000 persons have been vaccinated with living plague without incident or accident. When the recurrence of plague among the vaccinated shows that immunity is at an end they will require to be re-vaccinated.

W. F. H.

OTTEN (L.). Pest-vaccinatie op Java. [**Plague Vaccination in Java.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1935. Oct. 29. Vol. 75. No. 22. pp. 1850–1864.

[Otten seldom loses the opportunity—and with very good reason still—of commenting on the unsatisfactory nature of plague statistics. His remarks apply to many other vaccination statistics.] The commonest fault is that vaccination is applied on a voluntary basis and the mortality among the willing is compared with that among the unwilling. Now it is only too common that, both in social status and in religious belief, these groups are entirely different and that these circumstances involve wholly different modes of life. Again vaccination may be slowly adopted and be completed only by the end of an epidemic. Such an epidemic, at the height of its virulence, claims its victims from an essentially non-vaccinated population, and so the figures of mortality become steadily more favourable to the vaccinated, who make their appearance in the population as the epidemic is declining. This favourable effect is enhanced if the epidemic is localized and the vaccinated are chiefly resident in the unaffected region. Probably no statistical data take account of, what is so elusive in the case of plague, its course in time and place, while a satisfactory control group is practically always wanting. The remedy is patent. Only vaccination according to an alternate case method can afford the necessary data; this involves separation of the test population into two nearly equal groups; that division should extend not only to modes of living but to the smallest unit of society—the family. Even this should be split up equally as far as possible according to sex and age. Nor does Otten merely preach an academic doctrine. He has applied it himself with satisfying and convincing effect. His new vaccine, or as it might be called his renewal of an old method of vaccination, consists of a living, avirulent organism. Such a method was employed by HAFKINE for cholera and STRONG for plague. The vaccine too, like that which has always been used for smallpox, is a living vaccine.

The plague strain “Tjiwidej” accidentally discovered, is so avirulent that both rat and guineapig can stand a whole culture. This is not such a very isolated phenomenon and it is possible to isolate avirulent variants from other plague strains.

The investigations which have been carried out with strain “Tjiwidej” show that it is protective in very small doses to those extremely susceptible animals, the house rat and the guineapig.

Whereas with a dead vaccine in the case of the rat, even after 3 injections, not more than 30 per cent. survive, there is a survival of some 85 per cent. when inoculated with a *single* dose of the living vaccine. In the case of man injections of 1/50 and 1/25 agar culture resulted in quite a slight and rapidly disappearing reaction. The temperature was raised merely some tenths of a degree. After extended animal trials and trials on volunteers the vaccine was made available for large scale operations and these were carried out on an alternate case basis. A total of 37,435 persons in two subdistricts were inoculated, the adults with 1/10, the children with 1/25 agar culture, and 44,757 were not inoculated. The respective mortalities were 38 and 213, or 1.01 per thousand as against 4.75. The duration of immunity is a matter of great importance, but there seems little evidence that this extends to more than the usual 6 to 8 months. Finally Otten reminds us that vaccination is but a temporary expedient. Improvement of the dwelling so as to cut off man, who is but a side-link in the plague chain, from the rat-flea sequence of events is the true solution of the plague problem.

W. F. H.

GIRARD (G.). Résultats de la campagne de vaccination antipesteuse, par germes vivants, effectuée à Madagascar (8 octobre 1934–10 mai 1935). [**Results of Plague Vaccination with Living Germs in Madagascar.**]—*Ann. de Méd. et de Pharm. Colon.* 1935. Oct.–Nov.–Dec. Vol. 33. No. 4. pp. 898–919.

A communication on the subject of plague vaccination with living germs in Madagascar has already been noticed [*this Bulletin*, 1934, Vol. 31, p. 885]. At that time the use of the avirulent plague strain "E.V." had seemingly justified itself. The present trial is the sequel to the previous one and has been of a very elaborate nature. Actually a special census of the district operated on was made and great precautions taken that all the vaccinated and unvaccinated should be so recorded as to be capable of identification. Not only were the deaths from presumed plague recorded but also the total deaths from all causes. Measures were taken by means of smears and animal inoculation to certify, as far as possible, the deaths actually due to plague. The vaccine was transported rapidly to the place of use in large thermos receptacles holding 5 litres and the temperature to which it was exposed was not allowed to exceed 5°C. Only one dose was given, which varied with age:—1 cc., containing 1,500 million germs, to all individuals over 15 years; 0.7 cc. from 7 to 15 years; and 0.5 cc. from 2 to 7 years. Infants under 2 years were not vaccinated. In the course of the trial it was found that young children showed little reaction and the dose for those over 7 years of age was raised to 1 cc. The population of the district, on examination, amounted to 107,000. Of these 5,300 children of less than 2 years were excluded, so that vaccination operations were conducted on 102,000 persons with 46,879 vaccinated and 55,121 unvaccinated controls. As a round number the controls are estimated at 60,000. Deaths from plague among the vaccinated amounted to 22 or 0.47 per cent. and from all causes to 225 or 4.8 per cent. The corresponding numbers for the unvaccinated controls were 100 deaths (1.66 per cent.) and 581 deaths (9.7 per cent.). Many details of deaths are given and a special section deals with the subject, "want of success and its lessons." The actual results

obtained are, however, sufficiently striking to lead the author to affirm that "the new mode of vaccination can be officially recommended in Madagascar."

W. F. H.

SOKHEY (S. S.) & MAURICE (H.). Sur une méthode biologique de standardisation des vaccins antipesteux et sur le pouvoir de protection relatif de quelques vaccins antipesteux mesuré par cette méthode. [**A Biological Method of Standardization of Plague Vaccines and its Use for Comparison of Vaccines.**—*Bull. Office Internat. d'Hyg. Publique*. 1935. Aug. Vol. 27. No. 8. pp. 1534–1541.]

This is a brief summary of a method of standardization which is to be published later in detail. It consists in determining what is the smallest quantity of a plague vaccine which will immunize white mice against a given standardized testing dose. This method definitely eliminates the so-called toxic deaths among the test animals during protective vaccination. The animal used is the laboratory mouse, over 3 months in age and weighing 23 to 28 gm. Cultures for vaccine purposes are obtained originally by sowing venous blood from cases of grave human septicaemia on agar slopes. In order to test the virulence of vaccine cultures a dose of 0.5 cc. containing 6 to 12 bacilli (1 in 10 million dilution) is injected into at least 5 animals and the strain used should kill 4 out of the 5 in 5 to 10 days in order to be reckoned as virulent. No diminution of virulence has been found of these virulent cultures on rabbit blood agar even after long preservation, if kept on ice (4°–8°C.). A dose of 0.5 cc., containing 60 to 120 organisms, is used as infective testing dose 7 days after the administration of the last protective dose. Four or five graduated doses of the vaccine under test are used and 5 mice are injected with each of the doses in two equal portions at an interval of 7 days. These animals are kept under observation for 25 days after receiving the infecting dose. All animals which die and all that survive are examined for plague. A control series of 5 or 10 non-vaccinated mice accompanies each experiment. "The smallest dose of vaccine which saves 3 animals out of 5 is considered as the protecting dose. . . . Experiments should be made in duplicate." As a result of trials Haffkine's vaccine was found protective in a dose of 0.001 cc., Lister Institute vaccine in a dose of 0.008 cc. and Paris vaccine in a dose of between 0.008 and 0.015 cc. Other vaccines were also tested.

W. F. H.

TIKHOMIROVA (M.). **The Rôle of the Jerboa, *Dipus sagitta* Pallas, in the Epidemiology of Plague.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1935. Vol. 14. No. 1. [In Russian pp. 61–63. English summary pp. 63–64.]

Spontaneous plague epizootics have been observed among jerboas, *Dipus sagitta* Pall., in the sandy steppes of the Volga-Ural. These have been accompanied by epizootics among *Pallastomys* (= *Meriones*) *meribianus* Pall. Whole families of jerboas have succumbed to plague. From the experiments he has carried out with minimal doses of *Past. pestis* intraperitoneally the author concludes that the rodent, which succumbed with acute plague in 1–2 days, is a very sensitive test animal and may be used instead of the guineapig.

W. F. H.

KUZNETSOV (N. J.) [Edited by]. **Campaign against Rodents in the Cis-Caucasian Steppes. Symposium of Reports on Work of 1932-1934.**—232 pp. With 55 figs. 1935. Rostov-on-Don: (Publ. by the Azov-Black Sea Regional Executive Committee.) [In Russian.]

This symposium is devoted to the results of a two-years' campaign against murines and susliks throughout an area of several million hectares in the steppes adjoining the Azov and Black Seas and in Northern Caucasus. In addition to the methods of combating these rodents, the reports deal with the ecology and biology of these animals. The first part of the symposium, being devoted to mice, is mainly of agricultural and domestic interest. The second part deals with the susliks (*Citellus pygmaeus*) the important rôle of which in the epidemiology of plague is well known.

N. J. KUZNETSOV describes the organization and results of the campaign in 1933-34. The work was carried out by the local population mobilized in hundreds, and divided into companies of about 300 each under the direction of an instructor. In dealing with a given area the workers moved in two rows, those in the first carrying bottles with chlorpicrin and cotton wool swabs, which were dipped into the poison and introduced into each suslik burrow encountered, while each worker in the second row carried a spade for covering up the treated burrow with earth. The amount of chlorpicrin introduced into each burrow was 2 gm., since previous tests proved that this dose had a lethal effect upon susliks at a minimum temperature of 6°C. As the result of this campaign over 116 million burrows were treated over a total area of 3 million hectares, the density of the suslik population being reduced to an average of 0.3 per hectare. In the author's opinion this thinning will effectively prevent the recurrence of epizootics among the rodents, while by repeated treatment of the same areas it may be possible to destroy the entire suslik population.

O. N. BOCHARNIKOV and K. T. KRYLOVA discuss the relative merits of various methods and apparatus for treating suslik burrows with chlorpicrin, hydrogen sulphide and diphosgene. P. N. STUPNITSKY describes experiments on the application of bacteriological methods for the destruction of susliks, using *Bac. typhi spermophilorum*, Mereschowsky and Danysz's bacillus. The pathogenicity of these organisms for "clean" susliks was confirmed, but attempts to transmit the infection to large numbers of captive susliks failed. The third part of the symposium is devoted to the ecology and biology of the steppe-inhabiting rodents.

C. A. Hoare.

TIKHOMIROVA (M.), SAGORSKAJA (M.) & ILJIN (B.). Die Nager und ihre Flöhe im Steppen, -Uebergangs-Landstrich der Nowo-Kasansker und Slomichinsker Rayons und ihre Rolle in der Epidemiologie der Pest. —*Rev. Microbiol., Epidémiol. et Parasit.* 1935. Vol. 14. No. 3. [In Russian pp.231-253. With 3 figs. [34 refs.] German summary pp. 253-254.]

SIMOND (P. L.) Comment fut mis en évidence le rôle de la puce dans la transmission de la peste.—*Rev. d'Hyg. et de Méd. Préventive.* 1936. Jan. Vol. 58. No. 1. pp. 5-17.

CALBAIRAC (M.) & SEYBERLICH. Au sujet de l'incubation de la peste bubonique. [**The Incubation of Bubonic Plague.**]*—Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 677-678.

The authors draw attention to the fact that, according to international sanitary convention, the maximum incubation period of plague is 6 days. Three quarantine cases have come under their notice which, owing to the strictness of the supervision exercised and the record of temperatures thrice daily, may be regarded as giving exact incubation intervals. These were 9, 7 and 10 days respectively.

W. F. H.

ICAIZA (Jorge Illingworth). Observación de peste bubónica en el Hospital General de Guayaquil. [**A Case of Bubonic Plague in the General Hospital at Guayaquil.**]*—Bol. Oficina Sanitaria Panamericana.* 1935. Sept. Vol. 14. No. 9. pp. 821-824.

The interest of this case lay firstly in the negative results obtained by gland puncture, the appearance in some of the blood cultures of a pneumococcus and the final establishment, after several inoculations of guineapigs, of *Pasteurella pestis* as the cause of the condition. In the second place it was found difficult, with no indication of any local rat epizootic or of any human cases of plague, to account for the occurrence of the disease. The patient was a labourer engaged in emptying freight railway wagons from the interior. It was concluded, on the evidence, that he had contracted plague through a chance infection by means of a flea which had been transported in railway baggage.

W. F. H.

YENIKOMSHIAN (H. A.). **A Case of Septicaemic Plague simulating Pernicious Malaria.***—Indian Med. Gaz.* 1935. Sept. Vol. 70. No. 9. pp. 508-509.

A case of plague in a female child of 12 years is here described in which the main symptom was coma. In view of the fact that she came from a malarial district, had had malaria, and had a large hard spleen, the most natural diagnosis was a pernicious malaria of cerebral type. A blood culture made during life, puncture of the spleen after death, and animal tests all showed that this was a case of septicaemic plague.

W. F. H.

MONTAGNE (M.) & RIVOALEN (A.). Un cas de méningite pesteuse. [**A Case of Plague Meningitis.**]*—Bull. Soc. Path. Exot.* 1936. Jan. 8. Vol. 29. No. 1. pp. 21-23.

Records of plague meningitis are rare. The case was one of a child of 8 years whose sister had died suddenly after 2 days illness. There had been an axillary bubo, which disappeared after 3 injections of anti-plague serum. Nervous symptoms, however, persisted—rigidity of the neck with Kernig's sign and violent occipital headache. These became aggravated, with the onset of delirium, incessant movement of the hands and of the eye-balls, and spasms of masseters and left sterno-mastoid. Lumbar puncture and blood culture gave negative results. A second lumbar puncture gave an opalescent fluid and the culture of

this furnished definitely the plague bacillus, but this positive diagnosis was only forthcoming two days after the death of the patient.

W. F. H.

URIARTE (Leopoldo), MORALES VILLAZÓN (N.) & ANCHEZAR (Benjamin). Un procedimiento para investigación de la peste en los roedores. [**Examination of Rodents for Plague.**]*—Rev. Inst. Bacteriológ.* Buenos Aires. 1935. July. Vol. 7. No. 1. pp. 5-15. With 1 fig. English summary.

Small rodents often arrive at a laboratory in a state of decomposition and it has been an important advance to demonstrate with certainty the presence of the plague bacillus under these circumstances. The procedure developed by the authors is the same as that of PONS in Saigon. Cultures from the bone marrow will furnish pure plague growths even after putrefaction has set in. Marrow is obtained from the diaphysis of the upper end of the tibia or from the femur and is used on tubes of agar and broth, which are incubated at 18°C. The results obtained were excellent.

W. F. H.

URIARTE (Leopoldo) & MORALES VILLAZÓN (N.). Acerca de la diferenciación del bacilo pestoso. [**Differentiation of the Plague Bacillus.**]*—Rev. Inst. Bacteriológ.* Buenos Aires. 1935. Nov. Vol. 7. No. 2. pp. 287-296. English summary.

Ordinarily it is an easy matter to identify the plague bacillus. The authors advise, however, if there is any difficulty in distinguishing the plague bacillus from other pasteurellas and especially from *P. pseudotuberculosis rodentium*, adding to the carbohydrate tests those of adonite and rhamnose.

W. F. H.

URIARTE (Leopoldo) & MORALES VILLAZÓN (N.). Un cocobacilo simiipestoso en las ratas de Buenos Aires. [**A Plague-like Coccobacillus in Buenos Aires Rats.**]*—Rev. Inst. Bacteriológ.* Buenos Aires. 1935. July. No. 7. No. 1. pp. 91-98. With 2 figs. on 1 plate. English summary.

A pasteurella organism has been found in Buenos Aires rats which, although it is non-pathogenic to the rat, is very pathogenic if injected into guineapigs and rabbits. This small bipolar coccobacillus may easily be mistaken for plague. It is Gram-negative, indole-positive, non-haemolytic, blackens lead paper, produces neither coagulation nor change of colour in litmus milk and ferments glucose and saccharose but not rhamnose.

W. F. H.

GIRARD (G.). Présence d'un bactériophage antipesteux chez la *Xenopsylla cheopis* au cours d'une petite épidémie de peste à Tananarive. [**Plague Bacteriophage in the Flea.**]*—C. R. Soc. Biol.* 1935. Vol. 120. No. 31. pp. 333-334.

After having established, in the usual way, the presence of phage in the faeces of rats from a quarter of Antananarivo where human cases of plague had appeared, a further trial was made of the *X. cheopis* fleas captured on rats of the same quarter. Five experiments were done with 63, 28, 17, 13 and 45 *X. cheopis*, which were ground up, placed in a

bouillon flask at 37°C. and filtered through an L3 candle after 24 hours. A phage was found in the case of the batch of 63 fleas, which was as active as that obtained from rat faeces. The other batches proved phage-negative or little active. As a control 73 and 10 *cheopis* fleas were taken from a quarter of the town with no rat plague and these gave negative results. The existence of a phage in the flea implies that it came from the rat and the fact may have epidemiological importance.

W. F. H.

JOUKOW-WEREJNIKOW (N.) & FAWORISSOWA (B.). **Studies on the Nature and Significance of Bacteriophage Phenomena. III. Action of Bacteriophage in vivo on Plague Bacilli.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1935. Vol. 14. No. 3. [In Russian pp. 119-204. [28 refs.] English summary p. 205.]

"It was found that experimental guineapigs being injected both with a bacteriophage and large doses of plague culture succumbed simultaneously with control animals. In organs of the dead animals a large number of *B. pestis* was found microscopically. No culture, however, has been recovered till the 5th passage. But guineapigs infected with organs of the dead animals have invariably succumbed. Therefore cases may be when the bacteriophage and the bacilli can live in an organism without a marked reciprocal action. This phenomenon may be explained by the properties of colloids of the organism which prevent this action, as the authors have shown that the normal serum in vitro impedes a lytical action of the bacteriophage upon the plague bacilli."

ALAYON (Fernando). Bacteriofagoterapia na peste. (Estado atual da questão).—*Ann. Paulist. Med. e Cirurg.* 1935. Dec. Vol. 30. No. 6. pp. 569-572. [15 refs.]

DANZEL (L. A.). La "rati-scille," scille rouge raticide.—*Ann. d'Hyg. Pub., Indust. et Sociale.* 1935. Dec. Vol. 13. No. 12. pp. 677-701. With 2 figs. (1 map). [18 refs.]

CHOLERA.

RUSSELL (A. J. H.). *Recherches sur le choléra dans l'Inde.* [**Cholera Research in India.**].—*Bull. Office Internat. d'Hyg. Publique.* 1936. Jan. Vol. 28. No. 1. pp. 58-63.

Active research in cholera is going on at present in India, and will be published in detail in due course. Some indications of the lines of this research and interesting details are given in this publication. The whole population of an endemic zone comprising 10,000 people is under investigation during epidemic and inter-epidemic periods. Altogether 50,000 stool examinations have been made. In the investigation of numerous agglutinable and inagglutinable vibrio strains by chemical and serological methods it was found that the agglutinable vibrios of healthy persons could not be differentiated by the ordinary biochemical and serological methods from the typical cholera vibrio, but that these same two groups are capable of being separated by their chemical structure.

Some of the epidemiological observations on the test endemic population are noteworthy and the investigation, which includes a complete epidemiological history of each individual, has now run for more than a year. Of the 140 cases of cholera which have occurred, 10 per cent. were so slight that they would ordinarily have passed unnoticed. Carriers numbered 3.5 per cent. in the general population, but this figure rose to 9.1 per cent. for recent contacts. The mean duration of carriage was about 30 days. Most of the cases of cholera seemed to have arisen from previous cases and only in 4 was there a strong presumption that the source was a carrier.

Much evidence points to the necessity of intensive study of the non-agglutinable vibrios. In Calcutta during the inter-epidemic period most of the cases of cholera give only non-agglutinable vibrios, whilst the agglutinable vibrio is predominant at the peak of an epidemic. These observations, conducted over 5 inter-epidemic periods, support the contention that non-agglutinable vibrios can give rise to cholera.

Bacteriophage treatment research has been instituted in the hospitals of Calcutta with controls and applies so far to 1,200 cases. Mortality from cholera with ordinary treatment, compared with that of patients receiving cholera phage in addition gave percentages of 18 and 13 respectively. If the reservation were made that the vibrio isolated must be agglutinable, these percentages become 20 and 8 respectively, a result still more favourable to the employment of phage treatment.

One final point of interest is contained in the statement that the cholera toxin is not an endotoxin but an exotoxin with an extremely small molecule and easily destroyed.

W. F. Harvey.

SCHÖBL (Otto) & NUKADA (Minoru). *Versuche ueber Fische als Choleraträger.* [**Fish as Cholera Carriers.**].—*Kitasato Arch. Experim. Med.* 1935. Oct. Vol. 12. No. 4. pp. 313-323.

Fish form part of the daily diet in Japan and may be eaten raw. Any suggestion therefore that fish may, under certain circumstances, be carriers of the cholera vibrio is a matter of grave concern to public health authorities. The trials here undertaken were of the nature of feeding experiments and determination of the length of stay of cholera

vibrios in the gastro-intestinal tract. Infected food was given to carp by means of a stomach sound. Faeces were examined by removing the test material with the fish out of water. Cholera vibrios could be found in the intestine up to the sixth day, which is just about the length of time food remains in the body. They could be isolated in pure culture most easily from the stomach where the reaction is alkaline. On one occasion the vibrio was isolated from the faeces on the 17th day and on one occasion from the gall bladder. On the experimental findings the author concludes that fish are not to be regarded merely as mechanical agents but as potentially real carriers of the cholera vibrio.

W. F. H.

KUBOTA (Kazuo). Epidemiological Observation of Cholera in Formosa.—*Taiwan Igakkai Zasshi (Jl. Med. Assoc Formosa)*. 1935. Nov. Vol. 34. No. 11 (368). [In Japanese pp. 1791–1841. With 13 charts. [58 refs.] English summary pp. 1841–1843.]

RICE (E. M.). A Preliminary Epidemiological Study of Cholera with Special Reference to Assam and Suggestions for Further Investigations.—*Indian Jl. Med. Res.* 1935. Oct. Vol. 23. No. 2. pp. 467–473. With 1 graph.

LAHIRI (S. C.). **A Preliminary Report on the Study of Coagulation Time of Blood in Cholera Cases.**—*Jl. Indian Med. Assoc.* 1935. Dec. Vol. 5. No. 3. pp. 89–99. With 6 figs.

The method used to determine coagulation time was to fill a capillary tube with finger blood and to break off the end of the tube every 15 seconds until a fibrin thread made its appearance. Normally coagulation time by this method, which was carried out at room temperature, was found to be 3 to 5 minutes. Altogether 116 cases of cholera were studied and it was found that there was shortening of the coagulation time in most cases. This alteration in time shifted towards normal with the improvement of the patient. Although the coagulation time of the blood roughly followed the same course as the specific gravity it was independent of it and was indeed a more reliable index of the general condition of the patient.

W. F. H.

SODA (Y.) & collaborators. Sur le délai dans lequel les selles doivent être examinées pour la recherche du vibron cholérique. [**Admissible Delay in Examination of Stools for Cholera.**]—*Bull. Office Internat. d'Hyg. Publique*. 1936. Jan. Vol. 28. No. 1. pp. 64–66.

These experiments on the survival of cholera vibrios were carried out with the stools of cholera patients and with artificial stool mixtures. The conclusions arrived at are that :—(1) at least 5 gm. faecal matter are required in an examination for carriers; (2) this faecal matter should have been obtained in the 24 hours preceding examination; and (3) it should have been kept at a low temperature. Moreover, it is necessary under the conditions of quarantine in ports that the medical officer on board ships should sow the stools in peptone water, or that a small quantity of faeces, taken within 24 hours of arrival, should have added to them 10 cc. of peptone water at about pH 8·4 and be kept at a low temperature.

W. F. H.

SEAL (S. C.). **Difficulties in the Bacteriological Diagnosis of Cholera Vibrios.**—*Indian Med. Gaz.* 1935. Nov. Vol. 70. No. 11. pp. 614–620. With 10 figs. on 2 plates. [18 refs.]

Workers who are faced with the constant difficulties of identification of the cholera vibrio or, in other words, the separation of the true cholera vibrio from the cholera-like vibrio will find in this publication a very useful account of the cholera variants which present themselves in practice. They are considered under the headings—morphological, cultural, biochemical and serological characters; animal experiments and “phage” lysability. Some excellent plates accompany the text descriptions. No specific conclusion, as might have been expected, is reached. “The position as regards the so-called atypical forms of cholera vibrios is still unsettled. In a disease that is considered to be water-borne, the problem of the extracorporeal existence of cholera vibrios, *e.g.*, in water, is as important as that of human carriers. . . . Inagglutinable vibrios will probably in future have to be included in the aetiological factors of cholera.”

W. F. H.

WHITE (P. Bruce). **The Relation of Specific Carbohydrates to Roughening in *V. cholerae*.**—*Jl. Path. & Bact.* 1935. Nov. Vol. 41. No. 3. pp. 567–568.

The author considers that his long work on the nature of roughening justifies him in maintaining that this phenomenon represents the reduction or loss of specific smooth carbohydrate, and the appearance of a second, rough carbohydrate, which had remained masked in the “S” vibrio. An opposing view is that the second carbohydrate is *not* preexistent but a positive transformation peculiar to roughness.

W. F. H.

WHITE (P. Bruce). **The Q Proteins and Non-Specific O-Antigens of the Cholera Vibrio.**—*Jl. Hygiene.* 1935. Dec. Vol. 35. No. 4. pp. 498–503.

The object of this note was to investigate the characters of the Q cholera proteins and incidentally to show that they were identical with, or an important constituent of, the non-specific O-antigen of GARDNER and VENKATRAMAN [this *Bulletin*, 1935, Vol. 32, p. 769]. Another identity which seems probable is that of the total Q fraction with the “acid-soluble A substance” of LINTON and his co-workers. These Q proteins are alcohol-soluble antigens, capable of fractionation into 2 parts Q_1 and Q_2 : the former is obtained by “treatment of the total Q fraction with alkali water” and the latter by precipitation “from an aqueous suspension of the residue with HCl.” Their importance in relation to the specificity of vibrios may be summarized in the author’s own words:—

“Vibrios heated at 100°C. in saline suspension agglutinate in a generalised manner and often to a high titre with the antisera of the Q proteins of the cholera vibrio. The antibodies concerned are not inactivated by the carbohydrate fraction of *V. cholerae*. Occasional strains of vibrio react similarly in the living state with these Q (cholera) agglutinins. The antiserum of the Q_2 substance of *S. V. cholerae* seems to possess agglutinating properties additional to those of anti- Q_1 and anti- Q_2 R sera, rather more specific and possibly related to “carbohydrate” receptors. There is reason to believe that the Q proteins are true constituents of the living

vibrio and are not serological artefacts due to reagents and heat. It seems that these substances and their antibodies are important contributors to the "non-specific O agglutination" of vibrios recently discussed by Gardner and Venkatraman." W. F. H.

DOORENBOS (W.). Sur la présence d'hémolysines dans les jeunes cultures du vibron cholérique. [**Haemolytic Power in Young Cholera Cultures.**—*C. R. Soc. Biol.* 1936. Vol. 121. No. 2. pp. 128-129.]

Twelve strains of cholera vibrio, obtained from fatal cases of cholera and showing typical morphological and biological characters, were tested for their haemolytic power after 8 hours' and 24 hours' growth. Of the 8-hour growths 4 possessed strong, 5 a feeble and 3 no haemolytic power while none of the 24-hour growths showed any haemolytic power at all. W. F. H.

TAYLOR (J.) & AHUJA (M. L.). **Serological Variations in Vibrios from Non-cholera Sources.**—*Indian Jl. Med. Res.* 1935. Oct. Vol. 23. No. 2. pp. 531-544.

In continuation of their previous work on the development of the serological characters of *V. cholerae* by an inagglutinable vibrio the authors have experimented with three strains of vibrio having no relation to the cholera vibrio. These strains were, (a) *V. metchnikovi*, (b) an inagglutinable water vibrio, and (c) an inagglutinable vibrio from a healthy individual in an endemic cholera area. By intraperitoneal passage in mice and the preparation of cultures from the heart blood of these animals two types of colony began to emerge in all three strains. One colony was somewhat opaque and the other translucent. It was found that while the opaque colony corresponded to the original type strain, the translucent colony gave the typical biochemical and serological reactions of *V. cholerae*. In one respect, however, a difference was found separating these strains from the cholera vibrio. "The chemical structure of the three strains and also of their variants, as determined by their protein and carbohydrate fractions, differed from that found in the case of the agglutinable vibrios isolated from cholera cases in India." Thus there has been brought about a laboratory transformation in essential particulars of a non-cholera to a cholera vibrio. W. F. H.

LINTON (Richard W.), MITRA (B. N.) & MULLICK (D. N.). **Respiration and Glycolysis of the Cholera and Cholera-like Vibrios.**—*Indian Jl. Med. Res.* 1936. Jan. Vol. 23. No. 3. pp. 589-599.

Even when serological and haemolytic tests fail to differentiate cholera from cholera-like vibrios, there remain other tests, and particularly chemical analysis, which may effect a separation. Metabolic activities, as is shown in this article, may assist in the differentiation by taking account of respiratory and glycolytic activity. In this method suspensions of 18-hour growths were prepared in Ringer's solution, containing 0.1 per cent. glucose only for the respiration experiments and 0.1 per cent. glucose plus 0.1 per cent. NaHCO_3 for the glycolysis experiments. "Respiration is given in c.mm. of oxygen consumed per mg. of bacteria, and glycolysis in c.mm. CO_2 given off per mg. of bacteria."

The work "has shown that metabolism is most active in the group of vibrios isolated from cases of cholera and belonging to group I. In the members of group II the metabolic activity is less than in the first group and in group III is even less, although these two groups overlap in respect to respiration. The El Tor group IV is sharply marked off from the others by the fact that while its respiration is equal to that of group I, its aerobic glycolysis is negative." In this way for other groups differences are established on the basis of metabolism. In general a correlation has been found to exist between metabolism, chemical structure and source of the strains for groups I to VI.

Changes from agglutinability to inagglutinability are always accompanied by a lowering of metabolic activity as is also the change from smoothness into roughness.

W. F. H.

DOORENBOS (W.). Sur la variation du pouvoir hémolytique du vibron El Tor. [**Variation of the Haemolytic Power of the El Tor Vibrio.**]—*C. R. Soc. Biol.* 1936. Vol. 121. No. 2. pp. 130-132.

Just as in the case of cholera vibrios young 8-hour growths of El Tor vibrios proved more haemolytic than the 24-hour growth and one strain actually gave no haemolysis in 24-hour growth. This non-haemolytic strain was an interesting one. It was isolated from a case of diarrhoea with agglutinable vibrios in the stools. Among 40 agglutinable colonies on an agar plate sown from the stool of this patient there were found three which were non-haemolytic. On examination these three strains proved to be partially haemolytic after only 6 to 8 hours' cultivation, that is to say they behaved like the cholera vibrio.

It seems probable then that there are strains between the classical strongly haemolytic El Tor vibrio and the non-haemolytic cholera vibrio which must be placed in an intermediate haemolytic category.

W. F. H.

SCHOLTENS (R. T.). Analyse des récepteurs du vibron cholérique et du vibron El Tor.—*Ann. Inst. Pasteur.* 1936. Jan. Vol. 56. No. 1. pp. 68-75. [See also this *Bulletin*, 1934, Vol. 31, p. 312; 1935, Vol. 32, p. 771.]

MITRA (B. N.). Racemization of the Proteins of *Vibrio cholerae* and Related Organisms. Part I. The Diamino Acids. Part II. The Monoamino Acids.—*Indian Jl. Med. Res.* 1936. Jan. Vol. 23. No. 3. pp. 573-578. [17 refs.]; 579-588. [11 refs.]

LINTON (Richard W.), MITRA (B. N.) & SEAL (S. C.). Further Notes on the Cholera and Cholera-like Vibrios.—*Indian Jl. Med. Res.* 1936. Jan. Vol. 23. No. 3. pp. 601-607.

BANERJEE (Dhirendra Nath). Is Cholera Kidney a Form of Nephrosis?—*Jl. Indian Med. Assoc.* 1936. Jan. Vol. 5. No. 4. pp. 160-161.

In some respects the pathological, biochemical and clinical features of cholera may show certain characters in common with nephrosis, as

defined by VOLHARD and FAHR. If these be set aside and only the differential characters emphasized, it is found that, whereas in nephrosis there are no changes in the glomeruli, its course is chronic, oedema is early and constant, no retention of nitrogenous waste products occurs and there is no uraemia, the reverse is the case in cholera. Thus the cholera kidney is not to be regarded as representing a nephrosis.

W. F. H.

TAYLOR (J.), AHUJA (M. L.) & GURKIRPAL SINGH. **Experimental Observations on Cholera Vaccine.**—*Indian Jl. Med. Res.* 1936. Jan. Vol. 23. No. 3. pp. 609–617.

Actual protection experiments are the best test of the efficacy of a vaccine. The infection test in this case was an intraperitoneal injection in guineapigs of a smooth agglutinable heterogeneous strain of *V. cholerae*. It is ordinarily "accepted that cholera vaccine should not be used more than six months after the date of manufacture." The importance of these trials, which show the possibility of a much longer period of preservation, is obvious. Another point of great importance investigated has a bearing on quarantine regulations and on the shortest time within which a sufficiently high degree of immunity is developed in the vaccinated individual. The authors find (1) Cholera vaccine preserves full immunizing potency up to two years even when exposed to high hot-weather temperatures; (2) Immunity does not seem to be effectively developed, after inoculation, before the 5th or 6th day and is still higher by the 8th to 10th day, (3) Maximum protection is obtainable with strains of the characteristic prevailing serological type obtained from actual cases of cholera and showing H and O agglutination to a typical cholera vibrio serum, in this case the "original" Japanese type serum. In contrast with this it was found that "agglutinable strains from carriers and agglutinable variants from strains of origin other than cholera cases give a lower degree of protection."

W. F. H.

SUGINO (Kouhei). **The Antigenic Properties of the Cholera Vaccine prepared by the Philippine Bureau of Science.**—*Philippine Jl. Sci.* 1935. Oct. Vol. 58. No. 2. pp. 153–161.

The organism which is used in the Philippines for prophylactic vaccination against cholera was isolated several years ago from a fatal case of cholera and is known as strain No. 22. Its antigenic character has not been tested and this forms the subject of the present enquiry. The organism was non-motile, possessed a typical comma-like appearance, produced a pellicle on peptone water after several transplantations, gave the cholera red reaction and fermented glucose, maltose, and saccharose, but not mannite.

Immunological efficiency was tested by animal protection tests. Guinea-pigs were immunized by intraperitoneal inoculation and were then tested by intraperitoneal injection of lethal doses of a number of cholera strains. Protection was afforded against these strains. It may be concluded from these experiments that the cholera vibrio (strain 22), which is unique in its inability to ferment mannite and in its non-motility, "protects effectively against various strains of cholera vibrio."

W. F. H.

KAPUR (N. C.). A Plea for the Use of Concentrated Saline in Cholera.
[Correspondence.]—*Indian Med. Gaz.* 1935. Aug. Vol. 70.
No. 8. pp. 479-480.

The suggestion, put forward in previous correspondence [this *Bulletin*, 1935, Vol. 32, p. 764], that the efficacy of treatment of cholera by hypertonic salt solution lay more in the action of the salt than the supply of fluid, is here combated and the opinion advanced that "the administration of fluid plays almost as important a rôle as that of salts and alkalies." This restatement of the original doctrine is based on the extensive experience at the Campbell Hospital, Calcutta. *W. F. H.*

BANERJEE (Dhirendra Nath) & DATTA (Sunil Krishna). Sodium Lactate in the Prevention and Treatment of Cholera Acidosis.—*Jl. Indian Med. Assoc.* 1936. Jan. Vol. 5. No. 4. pp. 168-169.

The bicarbonate-carbonic acid ratio is considerably altered in cholera. Factors which favour the development of acidosis are the dehydration of the tissues, the excessive loss of base in the frequent stools and the effect of toxin in the production of excess acid. Treatment designed to restore the bicarbonate-carbonic acid ratio, consists in administration of fluid to overcome dehydration and stimulate diuresis and the use of alkali, usually sodium bicarbonate, in large doses. Some distinct disadvantages accompany the use of large doses of sodium bicarbonate intravenously and the author has replaced it successfully with sodium lactate in a dose of 10 cc. of the molar solution per kilogram of body weight. The lactate ion is transformed to glucose and the sodium ion liberated combines with the excess of carbonic acid to form a rapid supply of bicarbonates. In this way acidosis is overcome without any precipitation of an alkalosis. *W. F. H.*

VENOMS AND ANTIVENENES.

MARTIN DEL CAMPO (Raphael). Nota acerca de la distribución geográfica de los reptiles ponzoñosos en Mexico. [**The Geographical Distribution of Poisonous Reptilia in Mexico.**]—*An. Inst. Biol. Mexico*. 1935. Vol. 6. Nos. 3 & 4. pp. 291–300. [46 refs.] English summary.

Forty-six species of reptiles were investigated in Mexico as regards their geographical distribution. Fourteen species of coral snakes, the *Micrurus* genus of Elapinae, occur generally in the country; a marine snake, *Pelamydrus platurus*, all along the Mexican Pacific southward from the Gulf of California; three species of *Ancistrodon* (Crotalinae), *A. bilineatus*, locally known as "cantil" and "freno" along most of the Pacific coast, and two others, *A. piscivorus* (water viper) and *A. contortrix* (copper-head) on the northern frontier; *Sistrurus* is represented by two species, *S. caternatus edwardsii* in the north, at Sonora, Tamaulipas and perhaps Durango, and *S. ravus*, in wooded districts and the warm and humid lowlands, and eastern slopes of the Central Plateau. Sixteen species of rattlesnake, *Crotalus*, occur in various parts of Mexico, some in hot dry lands, others in hot moist districts. Eight species of *Bothrops* are found in the moist, hot, wooded regions of the east and south-east. Finally, two species of *Heloderma* or poisonous lizard, *H. horridum*, and *H. suspectum* ("Gila monster"), are known, the former being met with in the west and south and the latter chiefly in the south-east, but may be seen almost anywhere along the Pacific slope.

H. H. S.

PEPEU (F.). Studi sull'ofidismo nelle Colonie Italiane. [**Snakes in the Italian Colonies.**]—*Terapia*. 1935. Dec. Vol. 25. No. 198. pp. 353–363. With 12 figs. (9 on 4 plates). [20 refs.]

The following snakes are met with fairly frequently and are consequently of practical importance for production of suitable antivenene for treatment, particularly important now that military operations are being undertaken:—

VIPERIDAE: In Libia: *Cerastes cerastes*; *C. vipera* and *Echis carinatus*.

In Eritrea: *E. carinatus*, *Bitis arietans*, *Atractaspis irregularis*, *A. magrettii*.

In Somalia: *E. carinatus*, *B. arietans*, *A. engdahli*, *A. leucomelas* and *A. microlepidota*.

COLUBRIDAE: *Naia haie* in all three, and *N. nigricollis* in Eritrea and Somalia.

Some idea of the relative frequency of the chief snakes may be obtained from the captures made during 4½ months in Tessenei (south of Kassala near the border between Eritrea and the Anglo-Egyptian Sudan): *Echis carinatus* 513, *Naia nigricollis* 11, *Naia haie* 10, *Bitis arietans* 4, *Atractaspis magrettii* 1.

H. H. S.

GITHENS (Thomas S.). **Studies on the Venoms of North American Pit Vipers.**—*Jl. Immunology*. 1935. Aug. Vol. 29. No. 2. pp. 165–173.

Twenty-six species of snakes were studied, the following points being specially investigated: (1) The amount of venom obtained by

extraction ; (2) The toxicity of the several venoms ; (3) The relative danger to man. The total number was made up of 21 species of rattlesnake (*Crotalus*), three of Moccasin (*Ancistrodon*) and two *Sistrurus*.

As regards the first point, the amounts obtained varied considerably, the average being 0.1–0.3 cc. or 30–100 mgm. of dried venom. *Crotalus adamanteus* and *C. atrox* would give an average yield of 0.5 cc. or more, whereas small species such as *C. lepidus*, *C. tigris*, *Sistrurus catenatus* and *S. miliarius* (pigmy rattlesnake) yielded less than one-tenth as much. Moreover, there were wide differences within the same species, some after several weeks in captivity producing little or no venom, while others after hibernating may give amounts far above the average. Averages of large numbers only have, therefore, real value. Speaking generally, the amount secreted varied directly with the size of the species.

As regards toxicity ; all the venoms are complex and contain poisons acting on the blood, the vessel walls, the central nervous system and other tissues. The toxicity of the venom varied within a narrow range in each species as a rule, but closely related species might show wide differences. The more primitive, from the evolution aspect, the more toxic to the nerve centres is the venom. Those secreting a small amount have usually the more active venom, so that the number of fatal doses contained in an average extracted amount is more nearly constant than the toxic dose in mgm. of the dried product. Reliable data in respect of the relative danger to man are not easy to obtain, for the species of snake biting is often undetermined, half the reports merely stating "bite by a rattlesnake." In general, the larger the snake the more dangerous to man ; the notable exception to this was *Crotalus cerastes* the death rate from which was higher than its size and the toxicity of its venom would lead one to expect. H. H. S.

VON KLOBUSITZKY (D.). Biochemische Studien ueber die Gifte der Schlangengattung Bothrops. I. Mitteilung: Die blutgerinnungsfördernde Wirkung und die Reinigung des Giftdrüsensekretes der *Bothrops jararaca*. [**Biochemical Studies of the Venom of the Ophidian Genus *Bothrops*.**]—*Arch. f. Experim. Path. u. Pharm.* 1935. Sept. 11. Vol. 179. No. 2. pp. 204–216. [25 refs.]

The paper begins with references to previous work on the coagulating action of snake venom. Some authors have ascribed this to a property inherent in the toxic substance ; others state that it is quite distinct from the toxin ; again, some state that the same snake-venom sometimes causes haemolysis, at other times coagulation of the blood. The object of the author's work was to clear up these differences of opinion. He used the venom of the snake *Bothrops (Lachesis) jararaca* in the fresh state, in a solution of the dried venom, and as toxin, free from all proteid matter. The coagulative action was tested on human blood, and on oxalated blood of the horse. It was found that fresh venom produces haemolysis in a strength of 5.5 per cent. ; it inhibited coagulation in strengths of 0.02 to 0.01 per cent. ; and caused coagulation in the strength of 0.005 per cent. and under. So also, when the dried venom was tested, it was found that the action depended upon the degree of concentration. With a strength of 0.4 per cent. coagulation occurred ; with higher strengths, haemolysis

followed. The author describes the method used to prepare proteid-free toxin: he calls this substance "Bothropotoxin,"; with it he found that, at low degrees (*e.g.*, 0.1 per cent.) of concentration, coagulation occurred; in high degrees of concentration (above 1 per cent., and up to 10 per cent.) coagulation was prevented. In contrast with the results obtained with fresh venom or simple solutions of dried venom, the purified toxin never caused haemolysis. It was thought possible that the coagulating effect was not a property of bothropotoxin, but of some ferment attached to the venom; experiments were therefore made to ascertain whether two principles, toxic and coagulative, could be separated by electrophoresis, ultrafiltration, and heat. None of these methods succeeded, and the author could only establish the fact that there is a well-marked parallelism between the toxic and the coagulative action of bothropotoxin; if one property is destroyed, the other is destroyed too. In order to investigate the mechanism of the coagulating action, experiments were made with defibrinated blood, with washed blood-corpuscles, and with fibrinogen solution. It was found that bothropotoxin only causes coagulation when the blood contains fibrinogen, prothrombin, and thrombokinase; that is, it can only take the place of calcium.

Composition of *Bothrops* venom. The venom contains 9.7 per cent. of nitrogen: albumens and globulins are precipitated by heat: no albumose was found, but peptones are present. 5.2 per cent. of the venom can be extracted with petrolether; the extract contains two substances, one of which, brown in colour, is soluble in alcohol and water, but is insoluble in benzol or chloroform. The other constituent, yellow in colour, is soluble in chloroform. Neither of these substances possesses toxic or coagulative properties: the author proposes to deal with their chemical composition in a future paper.

Conclusions.—It is only in low degrees of concentration (0.005 per cent. in the case of fresh venom, 0.4 per cent. in that of solutions of dried venom) that coagulation of oxalated blood occurs; moderate strengths (0.02–0.01 per cent.) prevent coagulation, and cause haemolysis. It was not found possible to separate the toxic and coagulative principles of the venom. Bothropotoxin differs from the whole venom in possessing no haemolytic action. H. J. Walton.

VON KLOBUSITZKY (Dionysio). Estudos biochimicos sobre os venenos das serpentes do genero *Bothrops*. I. Acção coagulante e purificação da secreção da glandula venenosa da *Bothrops jararaca*. [*Biochemical Studies on Bothrops Venom. I. Clotting Action and Purification of the Venom of B. jararaca.*]—*Mem. Inst. Butantan*. 1935. Vol. 9. pp. 259–273. With 1 fig. [25 refs.] English summary.

[This appears to be largely a repetition of the work reported in the foregoing.]

The venom of *Bothrops jararaca* was found to bring about coagulation only when present to the extent of 0.005 per cent. or less; in higher concentrations, 0.02–0.01 per cent., it leaves the blood unchanged as regards clotting, in still higher concentrations it causes haemolysis. A dried extract, yellowish-green in colour, was obtained and named bothropotoxin, which formed foaming colloidal solutions on addition of water or 50 per cent. alcohol. It contained 9.7 per cent. nitrogen of which 8.97 were coagulable proteins and 0.73 other nitrogenous bodies,

chiefly proteins; no albumoses were found. By Soxhlet's method 5.29 per cent. ethereal extract was obtained, with a brown coloured substance, soluble in water or alcohol, and separable in a crystalline form when acted upon by concentrated NaOH. There was 4.4 per cent. non-volatile mineral substances, 0.18 per cent. chlorine. Unsuccessful attempts were made to separate the toxic and coagulant constituents. The coagulating action is believed to result from interaction of two factors, perhaps more, "one of which manifests itself in the substitution of calcium and the other in the destabilization of fibrinogen." The haemolysing, or at least anticoagulant effect of the higher concentrations of the toxin may be due to some impurity or third factor present.

H. H. S.

CHOPRA (R. N.) & ROY (A. C.). **Some Observations on the Haemolysis caused by Snake Venoms. (A Preliminary Note.)**—*Indian Med. Gaz.* 1936. Jan. Vol. 71. No. 1. pp. 21–23.

The authors have been studying certain biochemical characteristics of snake venoms, notably those of the Indian cobra and the Daboia (Russell's viper), in an attempt to associate pharmacological properties with certain constituents. In the present paper they record an investigation into the haemolytic properties of these venoms on different species of animals. Their technique was as follows:—

"The blood was drawn under strictly aseptic conditions in sterile citrated saline solution and washed several times with normal saline solution, aseptically, and a one-per-cent. suspension of the red corpuscles in normal saline was prepared. After the addition of the venom solutions (0.01 per cent. in normal saline) the tubes were put in the incubator at 37°C. for 2 hours and then in the ice-chest overnight and readings were again taken after 21 hours."

Cobra venom haemolysed rapidly, the viper venom caused no haemolysis in 2 hours but in 21 hours the haemolysed red cells formed a coloured zone with clear supernatant fluid. If the venoms were previously passed through a Seitz filter no haemolysis occurred with either. Had the haemolytic element been eliminated by the filtration or merely inactivated? Ordinarily, these venoms will not haemolyse sheep's cells, but will do so if lecithin is present; after passage through the Seitz filter the venom had no haemolytic power even in the presence of lecithin. Their proteolytic action—dissolving fibrin, liquefying gelatin—and the power of clotting milk were not affected by filtration. In general, filtration removed the haemolytic action of cobra venom and of the Daboia venom; it was found, however, that the respiratory effect of cobra venom was little impaired, though the effect in this respect on Russell's viper venom was marked.

H. H. S.

GRASSET (E.) & ZOUTENDYK (A.). **A Comparative Investigation into the Antigenic Properties of Detoxicated Indian and African Venoms and the Cross Action exerted by the Respective Antivenenes.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. Jan. 25. Vol. 28. No. 4. pp. 391–398.

The authors have shown that strong solutions of African snake venoms may be rendered atoxic although retaining their antigenic properties and giving rise to potent antivenenes [see this *Bulletin*, 1934, Vol. 31, p. 103]. Having obtained some desiccated venom of *V.*^{as}

russelli and *Naia tripudians* from Kasauli, they undertook a series of interesting and important investigations.

1. *Comparison of Indian with African venoms.*—It must be understood that no general conclusions as regards the relative toxicities of these could be drawn, for, as is well known, the lethal dose of venoms varies according to time of year, feeding, moulting, etc.; the authors can only state their findings with the actual samples with which they worked. They found that the venoms of *Naia tripudians* and *Naia flava* (Cape cobra) were of nearly equal potency, 0.5 mgm. of the former and 0.4 mgm. of the latter, intravenously administered, killing a rabbit in 1½–2 hours. Daboia (Russell's viper) venom is much stronger than that of *Bitis arietans* (puff adder) or *Causus rhombeatus* (night adder); 0.2 mgm. of the Daboia venom killed a rabbit in a few minutes, whereas 1.0 mgm. of Bitis venom killed in 2 hours, and 10 mgm. of Causus in 18–24 hours.

2. *Whether concentrated solutions of Indian venoms could be detoxicated* like African venoms, by incubating at 37°C. in presence of formalin. For African (Cape cobra) venom broth had been found essential, so these were similarly treated. When formalin is added to Cobra venom a heavy precipitate forms, but this seems merely to enhance the antigenic value (*cf.* alum, tapioca, etc., added to diphtheria toxin). Both the Indian venoms were rendered practically atoxic by the above method, rabbits being able to withstand the equivalent of 200 m.l.d. of Daboia venom and more than 100 of Indian cobra venom, after the venom had been kept for 3 weeks at 37°C. with 1 per cent. formalin.

3. *The antigenic properties of detoxicated Indian snake venoms.*—Though these were considerable, the results with Indian cobra anavenene were much lower than with the Cape cobra product. But rabbits immunized with Cape cobra venom withstood more than 6 fatal doses of the Indian cobra venom, administered intravenously.

4. *Tests of the cross efficacy of Indian and African antivenenes.*—It was found that the Indian serum had but a weak neutralizing effect on African viperine venoms; 2.0 cc. would not neutralize even one fatal dose of Bitis venom. It was further remarked that while the Indian antivenene had a moderate effect against Cape cobra venom and that of other African colubrids, the neutralizing effect of African antivenene on the venom of *Naia tripudians* was considerably greater than on that of the Cape cobra venom from which it was produced.

As regards *V. russelli* and *Bitis arietans*, their antivenenes have no appreciable neutralizing effect on the heterologous venom.

H. H. S.

GRASSET (E.), ZOUTENDYK (A.) & SCHAAFSMA (A.). **Studies on the Toxice and Antigenic Properties of Southern African Snake Venoms with Special Reference to the Polyvalency of South African Antivenene.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. Apr. 17. Vol. 28. No. 6. pp. 601–612.

This article contains much information and is full of interest, but does not permit readily of abstraction. The authors describe the venoms of five South African colubridae—*Naia flava* (Cape cobra), *N. nigricollis* (M'fesi), *N. haie* (Egyptian cobra), *Dendraspis angusticeps* (Mamba, green or black) and *Sepedon haemachates* (Ringhal's spitting cobra)—and five Viperidae—*Bitis arietans* (Puff adder), *B. gabonica* (Gaboon viper occasionally found in South Africa, but actually a Central

and West African species), *B. caudalis* (Horned adder), *B. atropos* (Berg adder) and *Causus rhombeatus* (Night adder). They also state the average yield of venom of each and their relative toxicities in animals such as the mongoose (*Herpestes pulverulentus*), Meercat (*Suricata tetradactyla*), Black-spotted Genet (*Genetta tigrina*), American grey squirrel (*Sciurus carolinensis*) and in frogs and scorpions.

Discussing the toxic and antigenic properties of the chief of these venoms, they conclude that for general use in South Africa where the inhabitants are sparsely distributed antivenenes to the two commonest—the Cape cobra and the Puff adder—are most needed. Preparation of such antisera has been greatly facilitated by using detoxicated concentrated solutions and anavenenes obtained by action of formalin for immunization of horses. This is done by injecting the mixed antigen over a period of 7 weeks. From experiments in rabbits it was found that 1 cc. of the concentrated serum will neutralize, after an hour's contact, 2 mgm. Cape cobra venom, the same of *N. nigricollis* and *N. haie*, 2.2 mgm. of *Dendraspis* and 1.75 of *Sepedon*, 9.0 of *Bitis arietans*, 11.0 of *B. caudalis* and more than 25.0 mgm. of *Causus rhombeatus*. Strange to say it is ineffectual against the Gaboon adder venom, although it is classed *Bitis*; clearly its venom is antigenically basally different from that of the Puff adder (*Bitis arietans*). Although it is rarely met with, the venom from this snake might usefully be incorporated, if this could be done without injuring the neutralizing properties of the other two. H. H. S.

CÉSARI (E.) & BOQUET (Paul). Recherches sur les antigènes des venins et les anticorps des sérums antivenimeux. Deuxième mémoire. Venin de *Cerastes cornutus* et sérums antivipérins (*C. cornutus*). [On the Venom and Antivenene of *Cerastes cornutus*.]—*Ann. Inst. Pasteur*. 1936. Feb. Vol. 56. No. 2. pp. 171–185.

In a former article the authors reported the results of a similar investigation on *Vipera aspis*. In the present they deal not only with the venom and antivenene of *C. cornutus* but also with the action of *aspis* venom with *Cerastes* antivenene and *vice versa*.

Speaking first of the venom of *C. cornutus*, the authors estimated its toxicity *in vivo* on rabbits, guineapigs and mice. Intravenous injection of 0.5 mgm. killed rabbits in 1–2 minutes, 0.45 mgm. had no effect estimable clinically. Subcutaneously, at least 5 mgm. were needed to kill and that in 10–12 hours. The results in guineapigs were more variable; 0.5 mgm. intravenously killed in less than 2 minutes, 0.4 and 0.3 mgm. in $\frac{1}{2}$ to 3 hours, smaller doses might not prove fatal at all, but on the other hand, 0.1 or even 0.05 mgm. might kill in 12 minutes or so, other animals might show paralysis of the hind limbs with dyspnoea and then recover, or die suddenly. Subcutaneously, at least 6 mgm. were necessary to cause death, more, that is, than in the case of the rabbit. In mice, death occurred in 1–2 minutes after intravenous injection of 0.04–0.1 mgm.; many withstand 0.02 mgm. and with the larger dose some survive for $\frac{1}{2}$ hour. Subcutaneously, 0.3 mgm. will kill in about 12 hours; higher doses such as 1.0 mgm. do not shorten the period.

The authors next estimated the coagulating power *in vitro*, and found that 0.0025 mgm. produce clotting of 2 cc. horse plasma in 15 minutes. Horse plasma was found more sensitive to *Cerastes* venom than that of cattle or sheep (the opposite was observed with *V. aspis* venom).

Above 60°C. the coagulant action is lessened and at 80°C. abolished. The haemolytic effect was determined, and 0.00035 mgm. was needed to haemolyse 1 cc. of horse's red cells, a little more than had been found in the case of *V. aspis* venom. Sheep cells appeared to be refractory.

Antitoxin potency was estimated in the rabbit only. (1) The *Cerastes* antivenene neutralized from 2,000–5,000 units. (2) *V. aspis* antivenene had a titre of 9,500 against the homologous venom, but only 200 against *Cerastes cornutus* venom. (3) *Cerastes* antivenene with a titre of 5,000 against its homologous venom, had one of 570 against *V. aspis* venom.

The anticoagulant, antihæmolytic, precipitating and flocculating properties were also investigated, and it is noteworthy that with regard to the last flocculation appeared more often in mixtures of *aspis* venom and *Cerastes* antivenene than with homologous sera.

The authors' findings may be summarized thus:—The antitoxic potency of *Cerastes* antivenenes is not very closely parallel with their protective properties against coagulation and hæmolysis, nor with the reactions of precipitation or flocculation. In the present state of knowledge only *in vivo* tests enable one to judge of the potency of antivenen sera. *Cerastes* antivenene completely neutralizes the homologous venene, but only to a small degree counteracts the effects of the coagulant in *V. aspis* venom, and *vice versa*.
H. H. S.

ZANETTIN (Giuseppe). Osservazioni sulle lesioni oculari determinate dal veleno della "*Naja nigricollis*" in Eritrea. [**Ocular Effects resulting from the Poison of *Naja nigricollis* in Eritrea.**—*Arch. Ital. Sci. Med. Colon.* 1935. Dec. Vol. 16. No. 12. pp. 856–858.]

One of the results of *Naja nigricollis* ejecting its venom into the eyes is said to be blindness, but from the two cases here recorded this would seem to be unusual. The first case was a man of 35 years who, turning over stones, unexpectedly came across a *Naja nigricollis*, which from a distance of 40 cm. spat poison into his eyes. He was promptly given Calmette's antivenene and sent to hospital. There was much pain and photophobia; the conjunctiva was strikingly pale especially that of the lower lid and fornix. The next day there was a little discharge, but no further symptoms developed and there was no constitutional disturbance. The second case was similar, except that no antivenene was given; recovery, however, was equally rapid, 3 days.

The poison would thus appear to have a proteolytic acid leading to a local necrosis of the conjunctiva. Seeing that general symptoms, usually severe in bites by this snake, were absent, either very little poison reached the eye or else absorption is practically nil. H. H. S.

KELLAWAY (C. H.) & WILLIAMS (F. Eleanor). **Antigenic Differences between the Venoms of the Tiger Snake *Notechis scutatus* and the Black Tiger Snake *Notechis scutatus* var. *niger*.**—*Australian Jl. Experim. Biol. & Med. Sci.* 1935. Mar. 16. Vol. 13. Pt. 1. pp. 17–21.

The venom of the *niger* variety of tiger snake, *Notechis scutatus*, is less toxic than that of the banded tiger snake itself but is a more powerful coagulant, both *in vitro* and *in vivo*. Further study of their antigenic differences has been made possible by the preparation of fractions of

these venoms. Univalent antivenene was prepared by injection of the venom of the typical banded form, and this was mixed with varying doses of the venoms and fractions; the mixtures after standing for an hour at room temperature were then injected into guineapigs. One cc. of the antivenene was found to neutralize approximately 0.4 mgm. of tiger snake venom, 0.2 mgm. of the corresponding thrombin-free fraction, and 0.29 mgm. and 0.15 mgm. respectively of the venom and thrombin-free fraction of the black variety of snake. In terms of lethal dose per 100 gm. of guineapig, 1 cc. antivenene neutralized about 200 doses of tiger snake venom, 103 of the thrombin-free fraction, and 49 and 26 respectively of the black tiger snake venom. A second sample neutralized 163 lethal doses of tiger snake venom, 40 of black tiger snake venom, 17 of copperhead venom, 13 of the venom of brown snake, 3 of cobra and 1.6 of death adder venom. Marked cross protection had been found between the venoms of tiger snake and copperhead in guineapigs, and these animals actively immune to two lethal doses of death adder venom resisted 8 l.d. of copperhead and 10 of tiger snake venoms.

The authors then tested the neutralizing power of sera of rabbits immunized with thrombin-free fractions of the venoms, and found that they gave a higher proportional protection against this fraction and against black tiger snake venom than does antivenene prepared against the entire venom, while similarly sera of rabbits immunized with the thrombin-free fraction of the black variety snake venom give greater protection against whole tiger snake venom and its fraction. The thrombin-free fractions are antigenically different. The venom of the black variety is less toxic than that of the type, when subcutaneously injected, but this does not depend on its more potent thrombin.

H. H. S.

WATANABE (Osamu). **Basic Substance in the Formosan Snake Venoms.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1935. Dec. Vol. 34. No. 12 (369). [In Japanese pp. 2083–2087. With 3 figs. on 1 plate. [10 refs.] English summary pp. 2087–2088.]

"1. In various kinds of Formosan snake venoms there may be found a substance that forms a nearly insoluble crystalline salt with flavianic acid. The formation of the crystals takes place even in a few drops of a very diluted solution of the venom, say for instance a 1 : 1,000 solution of the dried venom; it can be seen under the microscope shortly after the reagent, a 10 per cent. aqueous solution of flavianic acid, is added. A similar reaction follows upon the addition of picric acid, but this reagent is not suitable for the microscopical demonstration of the base, because the primary precipitate appears in the form of a nearly amorphous powder.

"2. The base is especially abundant in the venoms of the Taiwan-Habu (*Trimeresurus mucrosquamatus* Cantor) and the Ao-Habu (*Trimeresurus gramineus stejnegeri* Schmidt), and is contained in an appreciable proportion in the venom of the Kusari-hebi (*Vipera russellii formosensis* Maki), whereas the venoms of the Hyappo da (*Agkistrodon acutus* Günther) and the Okinawa-Habu (*Trimeresurus flavoviridis flavoviridis* Hallowell) contain little of it.

"In contrast to these Crotalid and Viperid venoms the Elapine venoms, at least those of the Taiwan-Cobra (*Naja naja atra* Cantor)

and of the Amagasa-hebi (*Bungarus multicinctus* Blyth) seem not to contain this basic substance.

"Whether or not these crystal-forming bases contained in the various venoms are all or in part identical cannot be decided at present. Likewise it remains yet uncertain, whether they are toxic or not, or toxic in the same degree. In any case it seems to be a very interesting problem from the standpoint of comparative chemistry to ascertain their presence or absence in as many kinds of snake venom as possible, and to study the chemical and physiological properties of the isolated bases. This may prove of interest also to the zoologist and the toxicologist.

"3. 0.5 g. of the dried venom of the Taiwan-Habu yielded 0.19 g. of the picrate. In its atomic composition the base corresponds to $C_5H_{14}N_2$, and in some of its properties it resembles cadaverin, but is, in the author's opinion, different from the latter substance. Although its physiological effects are yet unknown, it is not likely to be of a highly toxic nature."

SHORTT (H. E.) & MALLICK (S. M. K.). **Detoxication of Snake Venom by the Photodynamic Action of Methylene Blue.**—*Indian Jl. Med. Res.* 1935. Jan. Vol. 22. No. 3. pp. 529–536.

In this investigation the authors used venom of *Daboia* (*V. russelli*) and as experimental animals pigeons of 290–310 gm. weight. The minimum lethal dose having been ascertained as 0.03 mgm. the first experiment was undertaken to determine whether this venom was detoxicated by the photodynamic action of methylene blue in a dilution of 1 in 100,000, and the result was definitely positive. They next proposed to determine the effect of varying the time of exposure from $1\frac{1}{2}$ to 17 minutes, using the same dilution of methylene blue and 80 lethal doses of *Daboia* venom in 1 cc. The mixture proved fatal after only 6 minutes' exposure, but not after $10\frac{1}{2}$ minutes. Next, the action of the methylene blue in constant strength was tested, while the strength of the venom was varied and, in accordance with expectations, increasing the strength of venom called for longer exposure for detoxication. As a corollary of this, the venom was used of constant strength (10 m.l.d.) and the methylene blue dilutions varied from 10^{-4} to 10^{-6} , and the first was found to have the strongest action. Further variations were made in the strength of the methylene blue, using 20 m.l.d. of the venom and the optimum concentration of the dye was found to be 1 in 50,000. The detoxication by the photodynamic action of methylene blue was shown to destroy the antigenic properties of the venom.

H. H. S.

- i. TAYLOR (J.) & MALLICK (S. M. K.). **Observations on the Neutralization of the Haemorrhagin of Certain Viper Venoms by Antivenene.**—*Indian Jl. Med. Res.* 1935. July. Vol. 23. No. 1. pp. 121–130.
- ii. — & AHUJA (M. L.). **The Coagulant Action on Blood of *Daboia* and *Echis* Venoms and its Neutralization.**—*Ibid.* pp. 131–140.
- iii. — & —. **Observations on Poisoning with the Venom of *Echis carinata* and its Treatment with a Heterologous Antivenene.**—*Ibid.* pp. 141–146. With 1 plate.

This article, though short, gives an account of work of considerable scientific value and of much practical importance and must have entailed

much careful research. The authors investigated the following :—(a) *The relationship of the anti-haemorrhagin titre to the antitoxic titre of V. russelli antivenene.* Protocols giving the results of many tests are reproduced, and it is seen that there is "a marked parallelism between the neutralization of the lethal effect of the venom by the serum and the results of the skin haemorrhagin test." (b) *The neutralization of the haemorrhagin of viper venoms by heterologous antivenenes.* *V. russelli* antivenene was tested against the haemorrhagin of *Echis carinata* and *V. berus* venoms. The antivenene of the African puff adder *Bithis arietans*, was tested against the venoms of the other three. It is shown that the viper venom haemorrhagins are neutralized by the other antivenenes; probably, therefore, the haemorrhagin fraction is of the same nature in all. (c) *The toxicity of viper venoms after their haemorrhagin has been neutralized by heterologous antivenenes.* This was of special importance because the toxicity of viper venoms has been ascribed to their haemorrhagin. The authors found, however, that in the case of *V. russelli* and the others neutralization of the haemorrhagin does not diminish the m.l.d. as gauged by the intravenous test. Hence it follows that if death is due to the neurotoxin of the venom, heterologous antivenenes will be ineffective in treatment, though they may neutralize the haemorrhagin fraction.

ii. The authors have tested the coagulating action of the venoms mentioned on whole blood *in vitro* and also their action *in vivo*, injecting by different routes and in varying doses. In some cases intravascular clotting has been observed, in others total absence of clotting; these contrasting effects call for explanation, and this is the object of the present study. As regards the coagulant action of the venom of *V. russelli*, the authors confirmed the work of MACFARLANE and Burgess BARNETT; the action of *E. carinata* venom is less though still marked; with cobra venom the coagulant action is small, though in high concentrations the rate of coagulation is increased somewhat. They also tested the neutralization of the coagulant action of venoms by homologous and by heterologous antivenenes. As the result of investigating the coagulant effect of viper venoms *in vivo* the authors found that :—

" (1) When a relatively high dose of the venom is given death may occur with extensive intravascular clotting. This is only seen when death occurs within a few minutes of injection of the venom. The tendency to massive intravascular clotting varies in different species and in individual animals.

" (2) Extensive intravascular clotting does not always occur when a dose approaching that which can be considered the minimum lethal dose is given, even when death occurs in two or three minutes after injection.

" (3) When death is delayed beyond a few minutes extensive intravascular clotting does not occur although small fragments of soft clot may occasionally be found in the heart.

" (4) In the case of delayed death from the action of *daboia* and *Echis* venoms or when sub-lethal doses have been given, the blood is fluid at death. This is also seen when the animal is killed within three days of the injection of venom."

The coagulant actions of the venoms of *V. russelli* and *E. carinata* are neutralized by their homologous antivenenes, but there is no reciprocal heterologous action. Further, when death occurs rapidly intravascular clotting may not be seen, and if survival takes place the blood is incoagulable for a time, gradually returning to normal. Rapid action may produce massive clotting of the blood *in vivo*, while slower action leads to defibrination of the blood with deposit of the fibrin on the vessel walls and thereby renders the blood incoagulable.

iii. Details of the symptoms during life and the findings post-mortem of monkeys dying from poisoning from experimental subcutaneous injection of the venom of *E. carinata* are described. The results of treatment by cobra and *V. russelli* antivenenes confirm what has been stated above, *viz.*, that though the haemorrhagin may be neutralized, other constituents of the venom are not. They therefore reduced the incidence of haemorrhagic symptoms and may consequently be beneficial to a certain degree when homologous antiserum is not procurable.

H. H. S.

CHOPRA (R. N.), CHOWHAN (J. S.) & DE (N. N.). **An Experimental Investigation into the Action of the Venom of *Echis carinata*.**—*Indian Jl. Med. Res.* 1935. Oct. Vol. 23. No. 2. pp. 391–405. With 5 figs. [25 refs.]

An article of much interest and full of detail. *Echis carinata* has been stated, half a century ago, to be third in the order of poisonous snakes of India, followed by *Daboia* (*V. russelli*), the banded krait (*Bungarus fasciatus*) and the king cobra. The authors' experiments, however, do not support this view. They tested the action of *Echis* venom on lower forms of life such as *Paramoecium caudatum*, then on frogs, guineapigs, mice, cats and rabbits. The effects on the latter as regards blood pressure, the heart muscle, the blood itself—coagulation or haemolysis—the respiratory system, unstriated muscle (uterus, intestine) and the nervous system were carefully observed and recorded.

The authors found that the venom of *E. carinata* was less toxic than that of *V. russelli* or the cobra, at all events it was slower in action, because absorption is delayed (though sudden death will result if the venom is injected directly into a blood vessel). Locally, there is inflammation with oedema and perhaps gangrene, bleeding occurs from the mucous membranes. The venom contains enzymes, albumoses and globulins. Thrombin is present in large quantities. Splanchnic vessels are dilated and the abdominal organs become engorged, the peripheral vessels may constrict to counteract the fall in blood pressure, but if the dose of venom is large death occurs in collapse. The fall of blood pressure is not central, nor of cardiac origin. It acts on the intima of blood vessels, leading to the extravasation of sero-sanguineous fluid. Haemorrhagins are at least ten times as strong as that in *V. russelli* venom and a coagulant ferment weaker than in the latter. There is also a neurotoxin present. It has no marked action on the respiratory centre, the effect in this regard being probably secondary to fall of blood pressure and failure of blood supply. It has a marked curara-like action on nerve endings. Death is due primarily to circulatory failure, analogous to that in histamine shock. In delayed poisoning "there may be complete failure of the higher controls and cutting off of all central impulses to the periphery due to the curara-like action of the venom on the motor end-plates." H. H. S.

BEERENS (Julien) & CUYPERS (Hubert). Action du venin de cobra sur la circulation. [**Action of Cobra Venom on the Circulation.**]—*Bruxelles-Méd.* 1935. May 12. Vol. 15. No. 28. pp. 757–771. With 13 figs. [47 refs.]

The species of cobra whose venom was employed in this study is nowhere mentioned, but the unit is the minimum needed to kill a mouse of 20 gm. in 5–7 hours, *i.e.*, about 0.01 mgm. The fatal dose

killing a rabbit in 24 hours was found to be 0.005 gm. per kilo body weight and for a guineapig 0.004 gm. per kilo or 50 and 40 units respectively.

The authors investigated the blood pressure, pulse and respiration rates following intravenous injection in the marginal ear vein of the rabbit. This was found to produce a transient fall of blood pressure, at times preceded by a slight rise due to sympathetic stimulation. The fall occurs even after section of the vagus, consequently it is held to be due to a reflex *via* the nerves of Hering. As regards the electrocardiographic changes, these varied with the doses, whether single non-fatal doses or small doses repeated daily. The action is of a checking or brake character (une action freinatrice), inhibiting the Keith-Flack node and then the autonomic tissue, leading to retardation of the propagation of ventricular stimulus and, if the poisoning is severe, to a blocking of the bundle of His. In a normal animal complete auriculo-ventricular dissociation may occur in the agonal period, but in animals with severed vagi an isorhythmic dissociation may be noticed at the onset of the poisoning. The article is illustrated by reproduction of several sphygmographic tracings. H. H. S.

VELLARD (J.) & MIGUELOTE-VIANNA (M.). Modifications sanguines provoquées par les venins ophidiens (troisième mémoire). Variations de la réserve alcaline. [**Changes in the Blood resulting from Snake Venoms.**]—*Ann. Inst. Pasteur.* 1935. Aug. Vol. 55. No. 2. pp. 148–152.

This is the third memoir published on this subject by the authors [see this *Bulletin*, 1934, Vol. 31, p. 101; 1935, Vol. 32, pp. 376, 380].

The present is a report of an investigation of the alkali reserve following administration of the venoms of *Crotalus terrificus*, *Lachesis atrox*, and *Naia tripudians*, intramuscularly, subcutaneously, intraperitoneally, and, in one case, intraspinally, into dogs.

In all, 24 animals were the subjects of experiment; 14 with the venom of *C. terrificus*, 7 with that of *M. tripudians*, and 3 with that of *L. atrox*. The blood samples were taken by cardiac puncture (a) a few minutes prior to injection of the venom; (b) from 1–12 hours after injection; (c) at the time of stoppage of respiration or of cardiac action. If the interval between these last was prolonged, other samples were taken during this period. Protocols are reproduced giving some details, which may be summarized as follows:—

With all the venoms, there was a very slight reduction of the alkali reserve during the early stages of intoxication; in the agonal period this was more marked in the case of poisoning by the venom of *N. tripudians*, but not so great as with *Crotalus* and *Lachesis*. It is to be noted in this regard that the *Crotalus* and *Naja* venoms act in different ways on respiration; both, it is true, have a paralysing effect, but the venoms of *Crotalus* and *Lachesis* do this by bulbar action—respirations diminish in frequency but increase in amplitude; later the breathing is almost solely diaphragmatic, the movements become slower and slower and cease almost at the same time as the heart's action. *Naia* venom, on the contrary, has a curarizing action—asphyxia results from paralysis of the thoracic muscles and the heart may go on beating for 10–15 minutes after respiration has ceased. It is this difference of action which may account for the different results of the estimated alkali reserve. Other phenomena which may also play a part are the

action of the toxin on the liver cells, the renal function, variation in glucose, in lactic acid, in calcium, potassium and blood phosphorus. Until these various factors have been studied, it will not be possible to determine with certainty the mechanism of the variations in alkali reserve which follow poisoning by snake venoms. *H. H. S.*

LINK (Th.). Der Einfluss der Schlangengifte auf die Blutgerinnung. [The Action of Snake Venom on Coagulation of the Blood.]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1935. Aug. 30. Vol. 85. No. 5/6. pp. 504–512. [14 refs.]

B. A. HOUSSEY and A. SORDELLI divided snake venoms into two classes:—those that cause coagulation, and those that prevent it. Though the latter destroy the thrombokinase, they compensate for this by their own thrombin-like action; but, when they are very concentrated, they may destroy fibrinogen and so hinder coagulation. The object of Link's work was the verification of these results and their extension to other venoms. Venom of the following snakes was used:—

COLUBRIDAE.—*Naja* (2 species), *Sepedon*, *Notechis*, *Bungarus*.

VIPERINAE.—*Vipera* (7 species, including *russelli*), *Bitis*.

CROTALINAE.—*Lachesis* (3 species), *Crotalus* (5 species).

The author first determined whether the venoms favoured or hindered coagulation of the blood; in the former case, which of the following were affected by the venom: thrombokinase, thrombogen, thrombin and fibrinogen. The preparation of these substances (from the liver of the guinea pig and plasma of the sheep) is described. The experiments were made according to the method given by HIRSCHFELD and KLINGER (*Ztschr. f. Immunitätsf. u. Experim. Therap.*, 1914, Band 20, p. 51). The results obtained by Link are given rather briefly with each venom, and the author summarizes them as follows:—

(1) Snakes whose venom contains no coagulating constituent.

(a) Which destroy thrombokinase.

Naja tripudians, *N. flava*, *Sepedonhaemachates*.

(b) With a proteolytic action.

Vipera latastei, *Bitis arietans*, *Crotalus ruber*, *C. atra*, *C. horridus* (the last two have also a destructive action on thrombogen).

(c) Without a proteolytic action.

Mesocoronis, *Daboia* (= *V. russelli*), *Bungarus fasciatus*, *Crotalus terrificus*.

(2) Snakes whose venom contains a thrombin-like coagulating constituent.

(a) With a proteolytic action.

Vipera berus (and three other species of *Vipera*), *Lachesis* (three species).

(b) Without a proteolytic action.

Notechis scutatus, *Crotalus adamaalton*. *H. J. Walton.*

BARNETT (Burgess). The Haemostatic Uses of Snake Venom.—*Proc. Roy. Soc. Med.* 1935. Sept. Vol. 28. No. 11. pp. 1469–1472 (Sect. of Med. pp. 93–96).

Brief notes are given of several patients with severe and previously uncontrollable haemorrhage treated successfully with venom of *V. russelli* in a dilution of 1 in 10,000 used on gauze as a plug. Most were

haemophilics but one was a boy of 4 years suffering from purpura haemorrhagica. When the situation of the bleeding is such that the plug can be applied with pressure the success is immediate, the only danger being recurrence of haemorrhage from disturbance of the clot on removal of the plug; this, however, is easily controlled by further application of the venom. At times there is difficulty owing to the site of haemorrhage, e.g., in a boy of 18 months, a haemophilic, who was bleeding from a bitten tongue. He lost so much blood that two transfusions were needed. The haemorrhage was finally controlled by a dental plate being fixed over the tongue to maintain the venom-soaked dressing in position. According to the reports on a large number of patients this form of treatment was unsuccessful on two occasions only. Of one the author has no details to give [but see CAMBROOK below], the other was found to have a low excretion of ascorbic acid and was probably suffering from subclinical scurvy. The venom has been employed also to stop capillary oozing after breaking down adhesions of the liver, after decapsulation of the kidney, after tonsillectomy and prostatectomy. In no instance have any toxic symptoms attributable to the venom been observed. H. H. S.

CAMBROOK (J. Draper). **Snake Venom and Its Use in Dental Haemorrhage.**—*Proc. Roy. Soc. Med.* 1936. Jan. Vol. 29. No. 3. pp. 281-282 (Sect. Odontology pp. 19-20).

Experiment has shown that the venom of *Daboia (V. russelli)* in a dilution of 1 in 10,000 will coagulate ten times its volume of haemophilic blood in 20 seconds or less. In dentistry, as in some other conditions in which it is locally applied, the liquid should be sterile since it is in contact with a raw surface and this sterilization is accomplished by filtration, since sufficient heat cannot be used without destroying the coagulant property. It is unstable when kept in solution unless in an ice-chest; this difficulty was overcome by evaporating the venom with saline under reduced pressure [but see LAIGNEL-LAVASTINE, HUËT & KORESSIOS below on the effect of saline on venom], so that when required the proper strength of 10^{-4} was obtained by addition of water.

The author has now employed the venom in more than 50 cases, some of them haemophilics. He prefers block anaesthesia to local because injection must cause some, though perhaps only slight, damage near the socket. After the extraction, he applies a "squat plug" of cotton wool soaked in hot venom so that pressure is exerted on the edge of the socket, and the plug becomes mushroom-shaped. The patient bites on a gauze roll so that pressure is intermittent; this the author finds preferable to an appliance to keep up constant pressure, which may injure the socket and cause extravasation into the tissues. If there has been gross sepsis, he allows oozing between application of the plugs. He reports two cases of failure, one with signs of subclinical scurvy [see BARNETT, above], the other was a patient with a tear in the floor of the mouth following extraction by an outside dentist. Bleeding was from the sublingual tissues and stopped spontaneously. H. H. S.

BAKER (Geoffrey A.) & GIBSON (Paul C.). **A Case of Haemophilia treated with Russell Viper Venom.**—*Lancet.* 1936. Feb. 22. p. 428.

A most interesting record. A boy of 11 years, a haemophilic, came to the Torbay Hospital with a history of 10 days' bleeding from the

gum round an upper incisor. On admission he was pale and collapsed. Blood examination showed bleeding time $3\frac{1}{2}$ minutes, coagulation time $7\frac{1}{2}$ minutes. With a mouth-wash of acriflavine bleeding stopped, but a few days later recurred and it was found necessary to extract the tooth, 3 weeks after the first starting of the bleeding. [In the report November appears to be a misprint for October.] Oozing began about 8 hours after, and continued in spite of plugging with various substances, adrenalin, turpentine, tannic acid. Blood transfusion was given, but the incisions for this (two had to be made, the first revealing a vessel too small for the needle) continued to ooze and the boy's condition was becoming very grave. Three days after the transfusion venom of *V. russelli* was obtained and applied locally to the three bleeding sites, in a dilution of 1 in 10,000 on gauze plugs, repeatedly during 24 hours. The patient gave no further cause for anxiety; firm, elastic clots formed and the wounds healed. Some 3 months later, bleeding started round another tooth; this was extracted and the socket plugged as before with gauze soaked in the venom. Oozing was only slight and ceased completely in 3 days. The author concludes:—

"Special points of interest are: (1) The immediate haemostasis in the tooth socket. (2) The effectiveness at a site where application was not easily sustained; the tooth socket was shallow and could not be packed very efficiently. (3) The firmness of the clot; this was particularly noticeable in the socket, where the clot felt to be of the consistency of rubber. (4) The complete absence of any undesirable effects, although a considerable amount of the venom had to be used." H. H. S.

LAIGNEL-LAVASTINE, HUËT (P. C.) & KORESSIOS (N. T.). Sur les propriétés coagulantes du venin de vipère Daboia. [**Coagulant Properties of the Venom of *V. russelli*.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1935. Nov. 25. 51st Year. 3rd Ser. No. 29. pp. 1529–1533.]

The authors record their experiences with some 50 cases in which they employed tampons soaked in the venom to stop surface bleeding. As a diluent they used distilled water, as they found the action was reduced when physiological saline was used, while calcium chloride even in minute amount prevented its action. They used a strength of 0.5 mgm. in 5 cc. of water (*i.e.*, 1 in 5,000). Haemorrhage from tonsil or mastoid operation was stopped in one minute, whereas a tonsil untreated oozed for half an hour. The method is not applicable to large haemorrhages, such as arterial bleeding. No toxic effects, either immediate or remote, were seen in any of their patients, even when several tampons had to be applied. H. H. S.

ROSENFELD (Samuel) & LENKE (Sidney Edward). **Tiger-Snake Venom in the Treatment of Accessible Hemorrhage.**—*Amer. Jl. Med. Sci.* 1935. Dec. Vol. 190. No. 6. pp. 779–791. With 1 fig. & 1 graph. [11 refs.]

For the investigation recorded in this article the authors selected the venom of the Australian tiger snake (*Notechis scutatus*) for three reasons: (1) It quickly produces a firm clot of blood *in vitro*; (2) It hastens clot retraction; (3) It does not require preliminary collaborating factors—calcium, thromboplastin, prothrombin. They give a list of six snakes whose venoms are known to be potent coagulants. In the

order there stated the venom of *V. russelli*, which is used in England, is the weakest: *Notechis scutatus* (Tigersnake, Australia), *Pseudechis porphyriacus* (Black snake, Australia), *Echis carinatus* (Phoorsa, India), *Lachesis newwiedii* (Urutu, Brazil), *Bothrops atrox* (Fer-de-lance, America), *V. russelli* (Daboia, India).

The authors carried out a preliminary titration of the coagulant power of the venom, and devised a "clotting unit" for standardizing batches of venom. A clotting unit they define as: "The clotting power present in the highest dilution of venom which will produce coagulation of freshly citrated plasma within 2 minutes, the plasma being added to the various tubes of diluted venom in the proportion of 4 to 1. . . . Coagulation within a period of 2 minutes as selected because: (1) it is the nearest approach to clinical requirements, the several tubes seem to clot almost simultaneously at about 2^{n-1} and was (3) the more delayed clots are of poorer consistency." If n represents the number of the last tube in which clotting occurs within 2 minutes, then the number of units per cc. of the unknown solution = $5 \times 2^{n-1}$. Estimated thus 1/5,000 solutions of the various batches of the venom used by the authors proved to contain at least 7 units per cc. The venom solutions were prepared thus:—

"The dried venom was pulverized, and 100 mg. lots were weighed out on a quantitative balance. Sterile normal saline solution was added to produce the required dilution, 1/100 volume of 1 per cent. merthiolate solution being included. The resultant saline solutions of venom (1/1,000 and 1/5,000 containing 1/10,000 merthiolate) were stored in the ice box for 2 days and then tested for sterility. Aerobic cultures on blood plates and glucose broth were made. Since anaerobic spore-bearing pathogens have been described in snake venom each solution of venom was cultured anaerobically and also was injected in sublethal dosage (0.1 cc. of 1/5,000 solution) into the hamstring muscles of a guinea pig. No contaminant was found after the routine treatment with merthiolate. Since sterilization by ultrafiltration or heat seriously impaired the clotting power of the venom, they were not employed."

The authors then give details of 8 patients suffering from various haemorrhagic conditions treated with the venom in dilution of 1 in 5,000. The cases include haemophilia (2), purpura secondary to arsenic poisoning, essential thrombo-cytopenic purpura (2), multiple hereditary telangiectases, carcinoma of pancreas with jaundice, and a patient with a history of prolonged post-operative haemorrhages with, on this occasion, continuous oozing from leech-bites. Though successful in checking the bleeding, the venom did not prevent later recurrence nor did it affect the course of the disease of which the haemorrhage was a symptom.

H. H. S.

PECK (Samuel M.) & ROSENTHAL (Nathan). **Effect of Moccasin Snake Venom (*Ancistrodon piscivorus*) in Hemorrhagic Conditions.**—*Jl. Amer. Med. Assoc.* 1935. Mar. 30. Vol. 104. No. 13. pp. 1066-1070.

Moccasin (*Ancistrodon piscivorus*) venom was used in a 1:3,000 dilution of physiological saline, with 1:10,000 sodium merthiolate as preservative. An initial dose of 0.4 cc. was given, subcutaneously (being less painful than intradermally, as formerly given) and increased to 1.0 cc. For children under 10 years the minimum was 0.2 and the maximum 0.6 cc. Injections were usually given twice a week, but in serious cases more often. Most patients developed hypersensitivity at

the fourth or fifth injection (in 10–14 days) and had to be desensitized.

Details are given of: (1) Five cases of epistaxis and 2 of haemoptysis. In some of these haemorrhage did not recur after the first few injections and in most there was no recurrence for months after cessation of treatment. (2) Seven patients with menorrhagia. In some all the usual methods of treatment had failed—curettage, serum, calcium, transfusions. The bleeding was controlled by the venom injections, but there was a likelihood of recurrence after cessation of treatment, a recurrence controllable by further injections. (3) Ten cases of purpura of various kinds; the treatment proved unavailing in three. (4) Four cases of multiple hereditary telangiectases, with epistaxis. These were definitely controlled by the venom, but the treatment must be locally to the definitely. (5) Thirteen cases of thrombocytopenic purpura, response improved, four did not. (6) Three cases of haemophilia; in these it failed.

The authors state that except in thrombocytopenic purpura the blood picture is unchanged, the bleeding time is not affected and that the treatment "is of no value in cases of congenital haemophilia."

[See above MACFARLANE and Burgess BARNETT, on the value of the venom of *Vipera russelli* in haemophilia.] H. H. S.

GREENWALD (Harry M.). **Dilute Snake Venom for the Control of Bleeding in Thrombocytopenic Purpura.**—*Amer. Jl. Dis. Children.* 1935. Feb. Vol. 49. No. 2. pp. 347–352. With 3 charts. [11 refs.]

* Having noted the good results reported by S. M. PECK from the use of moccasin snake venom (*Ancistrodon piscivorus*) in cases of thrombocytopenic purpura the author made trial of it in three similar cases of his own. His procedure was to give intradermal injections of a 1 in 3,000 solution of the venom in physiological saline starting with 0.1 cc., and increasing gradually to 0.4 or even 0.6 cc., injecting every other day for the early doses, later every 3–4 days, the whole course of treatment extending from 4–20 weeks.

In all three active bleeding stopped after 3 or 4 injections; in one the bleeding time was reduced from 50 minutes to 3 minutes after 7 weeks' treatment; in the second from 20 to 5 minutes in 24 days; in the third from 32 to 6 minutes in 10 days and to 4½ minutes in 32 days. The platelet count increased from 10,000 to 175,000 in 15 days and to 220,000 in 80 days in one case; from 0 to 220,000 in 26 days in another (but later fell to 170,000); in the third from 75,000 to 125,000 in 47 days.

These results are impressive, but, as the author remarks, not too much can be based on so few cases; moreover, spontaneous remissions occur in this disease. H. H. S.

PECK (S. M.), CRIMMINS (M. L.) & ERF (Lowel A.). **Coagulating Power of *Bothrops atrox* Venom, on Hemophilic Blood.**—*Proc. Soc. Experim. Biol. & Med.* 1935. June. Vol. 32. No. 9. pp. 1525–1527.

The authors refer to the work of MACFARLANE and Burgess BARNETT on the employment of the venom of Russell's viper as a haemostatic. They themselves have worked with that of the Fer-de-Lance (*Bothrops atrox*), easily obtained from Central and South America and tolerating captivity well, so that a supply of the venom is readily available and cheap. They found that when given *intra venam* the m.l.d. for pigeons

of 250–350 gm. was 0.2–0.25 mgm., and for rabbits of 2 kgm. 0.015–0.02 mgm.; thus, pigeons are more resistant to the neurotoxins of the venom than are rabbits.

Its coagulating power was tested on two haemophiles; one was aged 25 years and his clotting time was 58–60 minutes, the other aged 36 and clotting time 100–106 minutes. To 2 cc. of the haemophilic blood 0.5 cc. of the venom was added in dilutions up to 1 in 10,000,000. The optimum concentration was found to be 1 in 10,000, the action increased up to this dilution, and then diminished. The first patient's clotting time was reduced to 15 seconds with the optimum dilution. In the case of the second patient the 1 in 10,000 dilution (0.5 cc. to 2 cc. blood) caused clotting in 1½ minutes and 1 in 100,000 in 4 minutes. Bothrops venom would thus appear to be more potent than that of Russell's viper. Since venoms often contain bacteria the filtrate through a Zeiss or a Berkefeld filter was tested. The neurotoxicity, tested in pigeons, was reduced but the clotting effect remained unchanged. Moccasin venom in dilutions from 1 in 2,000 to 1 in 20,000 was also tried with the blood of the same patient, but it either had no effect or else prolonged the clotting time. H. H. S.

MACFARLANE (R. G.) & BARNETT (Burgess). **Russell's Viper Venom.** [Correspondence.]—*Lancet*. 1936. Feb. 29. p. 509.

The authors' attention has been drawn to a statement, to which wide publicity has been given and attributed to a noted New York physician, that the use of snake venom as a haemostatic has been practically given up in the U.S.A. If this gains ground a proved valuable means of arresting haemorrhagic states, in haemophiles and others may fall into unmerited disrepute. They state that if moccasin venom is used (as it is in the United States) local reactions occur at the site of injection, but in England the venom of *Daboia* (*Vipera russelli*) is used and by local tampon not by injection, and that among the comparatively large number of cases in which it has been employed, they have not observed any ill-effects nor any reactions general or local (other than coagulation of the blood). Apart from this venom, cobra venom has been used as an analgesic in malignant growths, cobra and puff adder venom for epilepsy, and moccasin venom for haemorrhagic conditions and some skin affections. H. H. S.

MACHT (David I.). **Experimental and Clinical Study of Cobra Venom as an Analgesic.**—*Proc. Nat. Acad. Sci.* 1936. Jan. Vol. 22. No. 1. pp. 61–71. With 1 fig. [22 refs.]

This work as carried out at the Pharmacological Research Laboratory, Baltimore. Cobra venom—*Naia naia*, *N. haie* and *N. tripudians*—was used. In order to obtain a product free from bacterial contamination the preparation was made thus: Dried scales of the venom were dissolved in physiological saline, put up in glass ampoules, sterilized at a temperature not above 60°C. and assayed by the mouse method. When kept in the dark and in the ice-chest the preparation remained sterile and kept its potency for many months.

One hundred and fifteen patients received the treatment, of whom 105 were suffering from carcinoma, the others from Raynaud's disease, neuralgia, arthritis, etc. Of the cancer cases there were 14 of breast, 18 of uterus (14 cervical), 10 of rectum, 8 of jaw, 4 of ovary, 4 of tongue,

7 of bladder and various others in smaller numbers. The usual method of procedure was to give a small dose of 2 or 3 mouse units to ascertain if the patient had any idiosyncrasy; if not, a full dose of 5 units was injected (usually intramuscularly) next day and repeated daily until relief of pain was noted or the venom proved ineffectual. Ten histories were not complete; the remaining 105 are analysed. Thirty-eight (36.2 per cent.) obtained marked relief, 30 (28.6) definite relief, 23 (21.9) slight relief, in 5 (4.7) the result was doubtful, and in 9 (8.6 per cent.) there was no relief; that is, 86.7 per cent. obtained relief and 64.8 per cent. definite and marked relief of pain. Further examination to determine the pharmacodynamic action of the venom led to the conclusion that the seat of action was the higher nerve centres, resembling morphia in this respect, but not leading to addiction nor to any dangerous by-effects.

H. H. S.

CHOPRA (R. N.) & CHOWHAN (J. S.). Snake Venoms in Pharmacology and Therapeutics.—*Indian Med. Gaz.* 1935. Aug. Vol. 70. No. 8. pp. 445–453 [24 refs.]

MACCLURE (E.). Glomerulo-nephrite aguda diffusa, consequente a envenenamento por cobra (*Bothrops jararacussu*). [**Acute Diffuse Nephritis following Cobra Bite** (*Bothrops jararacussu*).]—*Bol. da Secretaria Geral de Saúde e Assistência*. Rio de Janeiro. 1935. Dec. 15. Vol. 1. No. 3. pp. 35–49. With 7 plates. French summary. [13 refs.]

A man of 29 years, when in perfect health, was bitten on the right hand by a cobra. He received antiserum 4 hours afterwards. Three days after admission to hospital oliguria set in, passing in another three days to complete anuria with hypertension and azotaemia and death occurred. The chief post-mortem finding was an acute glomerulo-nephritis; the condition is described in detail in the text and there are photomicrographs showing clearly the histological changes caused. Haematuria has been observed in others bitten by a snake of this species.

H. H. S.

PEPEU (F.). Prove sperimentali di vaccinazione antiofidica. [**Experimental Prophylaxis against Snake Venom.**]—*Atti V. Congr. Naz. Microbiol.*, Cagliari 27–31 Maggio 1934. pp. 158–161.

The addition of 0.4 per cent. formol [? 10 per cent. formaldehyde] to snake venom and maintenance at 38°C. transforms the venom into anavenin [analogous to anatoxin in diphtheria] after an interval varying from 40 days to 3 months. *Vipera ammodytes* was used for the tests. Such an anavenin is no longer toxic but possesses immunizing properties. The author tested it on a number of dogs, the poison itself being injected into the paw or the nose, and concludes that the method should prove very useful prophylactically for animals likely to be exposed to bites from this viper.

H. H. S.

CHOPRA (R. N.) & CHOWHAN (J. S.). Snake Bites and their Treatment in India.—*Calcutta Med. Jl.* 1935. Mar. Vol. 29. No. 9. pp. 459–485. With 2 plates. [16 refs.]

A good and useful general account of snakes, snake-bites and their treatment; it comprises a review of the subject, bringing forward no

new matter, but summarizing present knowledge. The subject is dealt with under the following sections:—Recognition of poisonous snakes and their ready differentiation from non-poisonous; the mechanism of snake bites; the symptoms produced by bites of cobra, krait, *Echis carinata* and *V. russelli*, and finally treatment. The last is considered under four heads: (a) Prevention of passage of the poison into the general circulation; (b) local neutralization of the venom; (c) specific antisera, giving methods of preparation and dosage; (d) treatment of special symptoms and complications. H. H. S.

WERWATH (K.). Verletzungen durch Kreuzotterbiss.—*Med. Klin.* 1935. Dec. 20. Vol. 31. No. 51 (1618). pp. 1667–1669.

AHUJA (M. L.). Specificity of Antivenomous Sera with Special Reference to Sera prepared with Venoms of Indian and South African Snakes.—*Indian Jl. Med. Res.* 1935. Jan. Vol. 22. No. 3. pp. 479–484.

The author obtained from South Africa dried venom of the Cape cobra (*Naia flava*) and concentrated antivenenes, with a view to carrying out the following series of tests:—

1. Comparison of the toxicity of Cape cobra venom with that of Indian cobra (*Naia naia*). In this and the other experiments related below pigeons of about 300 gm. were utilized, and injections were made into the pectoral muscles. Results were recorded 18–20 hours later.

The toxicity was found to be the same or very nearly so, viz., 0.3–0.4 mgm. being the respective lethal doses.

2. Potency of Cape cobra antivenene against the venom of *Naia naia*. 0.3 cc. protected against 0.8 mgm. of the Indian cobra venom.

3. The reverse of the last, the potency of Indian cobra antivenene against the venom of *Naia naia*. 0.5 cc. protected against 0.8 mgm. of the venom. Clearly, the two antisera are to a great degree protective against the other venoms.

4. Potency of these two antivenenes against the venom of the banded krait (*Bungarus fasciatus*). The results were negative; neither antivenene protected.

5. Comparison of the haemolytic properties of the Cape and African cobra venom showed them to be practically the same. Further the antivenene of each could inhibit the haemolysing effect of the other venom.

It follows from the above that these two cobras have the same type of neurotoxin and haemolysin in their venoms and that antivenene prepared in India against *Naia naia* will be equally serviceable as that prepared in South Africa against *N. flava* and vice versa. [See also GRASSET & ZOUTENDYK above.] H. H. S.

PEPEU (F.). Ricerche sulla specificità dei sieri antiofidici. [The Specificity of Snake Antivenenes.]—*Atti V. Congr. Naz. Microbiol., Cagliari, 27–31 Maggio 1934.* pp. 161–165. [14 refs.]

The author's experiments were carried out on white mice, with the venoms of *Vipera ammodytes*, *Aspis* and *Lebetina*, and the following sera: I.S.M. 293 and 132, Pasteur E. R., Pasteur A. N., Vienna, Anticrotalus and Antibothrops both from Butantán. He found the three venoms showed remarkable affinity. The anti-*ammodytes* and

anti-aspis neutralized completely all three ; anti-bothrops neutralized that of ammodytes and of lebetina, but only to a small degree that of aspis. He concludes that the anti-ammodytes serum can be utilized for treatment of poisoning by all the European vipers and by the Asian lebetina.

H. H. S.

MALICK (S. M. K.). **The Applicability of Flocculation Tests for Standardization of Antivenene.**—*Indian Jl. Med. Res.* 1935. Oct. Vol. 23. No. 2. pp. 525-529.

If the potency of antivenene could be determined by flocculation tests, analogous to that of RAMON in titrating diphtheria antitoxin, much time would be saved as well as cost in animals. The author carried out a series of pigeon-tests with cobra venom and horse antisera but unfortunately found that the method of flocculation is not applicable to antivenenes. Five out of 11 horses immunized did not show flocculation though a wide range of mixtures was tried ; the other six gave flocculation but not in constant proportions as a group, though individual horses did furnish constant results. By the pigeon test, though prolonged immunization gave increase of titre of the antivenene, the flocculation was the same with that of low and that of higher titre. The author concludes, therefore :—

“ The irregularity of the results of flocculation tests of antivenene, and the absence of any exact relationship of the mixtures employed to the titre ascertained by pigeon tests, make the method unsuitable for application in standardization of antivenene.”

H. H. S.

BOULNOIS (J.). Efficacité du sérum antivenimeux dans le traitement des hémoptysies tuberculeuses. [**Cobra Antivenene in the Treatment of Haemoptysis in Pulmonary Tuberculosis.**]—*Rev. Méd. et Hyg. Trop.* 1935. July-Aug. Vol. 27. No. 4. pp. 213-214.

Two cases are mentioned and they are noted here because the title may lead others to make trial of the method. The reports, however, are not convincing. The serum was injected intravenously in doses of 10 cc. In both cases, the spitting of blood continued for some time, in one patient for 48 hours, to reappear again 3 days later ; in the other, the bleeding ceased in 3 hours, but returned 2 hours later. Seeing that haemoptysis often ceases spontaneously, these cases are not convincing of the benefit of antivenene.

H. H. S.

DE CARVALHO (Jarbas). Accidentes mortaes pela picada de escorpião. [**Fatal Results from Scorpion Sting.**]—*Rev. Med.-Cirurg. do Brasil.* 1935. Nov. Vol. 43. No. 11. pp. 362-367. With 1 fig.

One of the most poisonous, if not actually the most poisonous, of scorpions is *Tityus serrulatus* of Brazil. It is generally held that scorpion sting, though very painful, is not fatal except to young children or the debilitated. Several cases in which the results were fatal have been reported not only in children but also in adults, according to the site of the injury and the quantity of poison inoculated. Notes are

given of 20 such, of ages varying from a few months to 48 years, and Dr. MAGALHÃES recorded that in one year there were 6,668 cases and 237 deaths, or 3.5 per cent. fatality.

H. H. S.

CERVERA (Ernesto). Suero anti-alacránico. [*Scorpion Antivenene*.] —*Bol. Oficina Sanitaria Panamericana*. 1936. Feb. Vol. 15. No. 2. pp. 142-149. With 3 charts.

The author, who is Director of the Institute of Hygiene, Mexico, first reviews briefly the history of the preparation of scorpion antivenenes, mentioning the work of C. TODD with the poison of *Buthus quinquestriatus*, that done at the Instituto Butantán, São Paulo, on *Tityus bahiensis*, at Durango on *Centruroides suffusus*; by HOFFMAN and VARGAS on the Nayarit scorpions, *C. noxius*, *C. limpidus* and *C. suffusus*. Records of cases are related from various district returns. In Iguala there have been no deaths among nearly a thousand cases; in nearly all a single dose of 5 cc. for children and 10 cc. for adults sufficed, but one child of 8 years with severe toxic symptoms was given 10 cc. During the 11 years 1924-34 there were in the Municipality of Iguala 136 deaths from scorpion sting; there were two adults, 50 and 58 years, the rest were under 8 years and 11 were less than 3 weeks old; in Colima one death occurred, a child of 11 months who did not receive the serum till moribund. In Tomatlán 27 cases between 2 and 66 years, all recovered; 19 had 5 cc., 6 had 10 cc. and 2 had 20 cc. It was usually given intramuscularly, occasionally intravenously, and in two severe cases by both routes. In Durango Municipality 275 cases were reported during 1934, but only two were fatal, a child of 7 years who had no serum and one of 3½ months who did not receive it till too late. In the town of Durango, DE LA PEÑA and VENZOR record 1,608 deaths from scorpion sting in 36 years, 1891-1926, an average of 44.6; in the next five years there were another 109 or 22 per annum.

H. H. S.

SERGEANT (Etienne). Action de l'injection sous-cutanée d'eau contre des doses mortelles de venin de serpents.—*C. R. Acad. Sci.* 1935. Feb. 25. Vol. 200. No. 9. pp. 789-790.

—. De l'emploi possible des injections sous-cutanées d'eau physiologique contre l'envenimement par morsure de vipère ou piqure de scorpion. [*Injectations of Physiological Saline in Viper and Scorpion Poisoning*.]—*Bull. Acad. Méd.* 1935. Mar. 19. 99th Year. 3rd Ser. Vol. 113. No. 11. pp. 363-364.

The first paper and the first part of the second paper refer to the same experiment.

Dr. Sergeant reports that subcutaneous administration of physiological saline in 151 mice was followed by survival of 25 of them (16 per cent.) when the animals were subsequently inoculated in another part of the body with "several" fatal doses of venom of *Cerastes cornutus*. All of 174 controls died and treatment by specific antivenene saved only 59 (39 per cent.) of another 151. He suggests that the saline acts by diluting the toxin before it has time to produce its usual effects. He has obtained similar results using the venom of *Buthus occitanus*, and adds that where the specific serum is not obtainable, the method of subcutaneous saline injection in large amounts should be tried in treatment. [No figures are given as to the size of dose employed in the experiments, nor any protocols. Also in the experiments,

the saline was injected prior to the venom. Before recommending its employment as a form of treatment, it would be well to test the effect when administered experimentally after the venom.]

H. H. S.

BLAIR (A. W.). *Spider Poisoning : Experimental Study of the Effects of the Bite of the Female Latrodectus Mactans in Man.*—*Arch. Intern. Med.* 1934. Dec. Vol. 54. No. 6. pp. 831–843. With 4 figs. [23 refs.]

——. *Life History of Latrodectus Mactans.*—*Ibid.* pp. 844–850. With 2 figs. (1 coloured).

This spider, *Latrodectus mactans*, known colloquially as the Black Widow, is the only one in the United States of America proved to be poisonous to man. In the second paper which is well illustrated the author gives an account of its appearance, habitat, feeding habits, mating, eggs, development and length of life. In the first he gives a full and very graphic account of the effects of a bite which he allowed to be inflicted upon himself with a view to testing which of the conflicting opinions as to its noxiousness was true. He allowed the spider to bite him on the terminal phalanx of the left little finger and symptoms soon set in.

The bite felt like the prick of a sharp needle ; in 15 minutes the pain, a dull ache, increased and extended to the upper arm ; the superficial cubital gland was tender (and remained so for a fortnight), and the phalanx of the bitten finger was purple-red, swollen and very painful ; in 20 minutes there was pain over the whole arm and left side of the chest ; in 30 minutes praecordial pain. These symptoms are regarded as belonging to the period of lymphatic absorption. During the succeeding 2½–3 hours, more serious symptoms prevailed from vascular dissemination. Fifty minutes from the time of biting, drowsiness came on, blood pressure was 106 systolic, 78 diastolic ; in an hour (*i.e.*, ten minutes later), transient epigastric pains, general flushes ; leucocytes 8,400 per cmm. ; 5 minutes later, epigastric pain more marked and in another 10 minutes, general malaise, pain in neck muscles, pulse rate 62. In 1½ hours from the bite, severe pain in back, chest and abdomen, speech difficult and jerky, respirations rapid and laboured, abdomen rigid, pulse 60. In 2 hours, pain now in legs, also inspiration gasping, expiration laboured and accompanied by a groan ; in 5 minutes more, inability to stand, legs flexed, tremor, collapse ; finger swollen, tender, cyanotic and painful. In 2½ hours from onset, spasm of flexors of forearms and hands, tingling in hands and feet, pulse rapid, thready, uncountable ; systolic pressure 75. This was followed by slight vertigo and throbbing in the head. Symptoms a little relieved by hot bath ; in 3 hours pains still more severe, respirations very laboured, patient writhing on the bed ; pulse weak, 120 ; pressure 80 systolic, 50 diastolic. Thereafter recovery was gradual. Vomiting took place 5½ hours from the onset ; after 9 hours there was still great restlessness and severe pain in abdomen, back and legs ; pulse rate 78, pressure 154 and 92 ; leucocytes 18,200 per cmm. polymorphonuclears 82 per cent., no eosinophilia. Urine showed a trace of albumen, many red corpuscles, blood and granular casts next day, and leucocytes in blood numbered 19,150 per cmm. with 77 per cent. polynuclears, 18 lymphocytes and 5 large mononuclears. Later the same day the face was flushed and swollen, hands tremulous, a papular eruption was seen on the bitten finger and the ulnar aspect of the hand ; diarrhoea. On the second day after the bite, 49 hours, the patient felt much better, the face was less swollen and abdomen less tense, but there were pains still in legs and feet, with chills and sweating. From then onwards recovery was rapid.

The best treatment would probably be early incision at the site of the bite. This account settles definitely the question of the noxiousness of the poison injected by the bite of this spider, for the subject was a man, 32 years of age, in perfect health at the time. H. H. S.

FINLAYSON (M. H.). "Knoppie-Spider" Bite.—*South African Med. Jl.* 1936. Jan. 25. Vol. 10. No. 2. pp. 43-45.

"Knoppie Spider" is the colloquial name for at least three species of *Latrodectus* in South Africa, viz., *L. geometricus*, *L. concinnus* and *L. indistinctus*. All are common in Cape Province; there may be confusion between the former two but the third is easily identified. *L. geometricus* and *L. concinnus* live in outhouses, and in walls and crevices of doors and windows, *L. indistinctus* in the cornfields and on the veldt. The average yield of poison, after evaporation to the dry state, from *L. geometricus* was 1 mgm., from *L. concinnus* about 2 mgm., and from *L. indistinctus* 3-4 mgm. The former two are less toxic than the last, the lethal dose of which for mice is 2-4 times that of cobra, but as the spider venom is obtained in a cruder state, it is probable that, if pure, the toxicity would be about equal to that of the Cape cobra. The antivenenes obtained by 4 intravenous injections into rabbits at weekly intervals were tested; 0.1 cc. of *L. geometricus* antiserum neutralized 1.0 mgm. of homologous extract, 0.4 mgm. of *L. concinnus*, whereas 0.2 cc. did not always protect mice against 0.1 mgm. of *L. indistinctus*. There was no neutralization of Cape cobra (*N. flava*) or puff adder (*Bitis arietans*) venom; hence it is useless to treat spider bite with either of these snake antisera.

Symptoms following bites by these spiders were: cramp-like pain in the chest and abdomen, with abdominal rigidity, sweating and salivation; often cyanosis with nausea, vomiting and dyspnoea. In animals there were sweating, restlessness, staring coat, rapid shallow breathing, paralysis, and convulsions preceding death—i.e., neurotoxic symptoms, like those of Cape cobra venom, though, as stated above, the antivenene of the latter is ineffectual in treatment. The best treatment is incision and application locally of potassium permanganate. Since *L. indistinctus* antiserum completely neutralizes the venoms of all three species, this is the best to keep for emergencies. H. H. S.

PLANTILLA (Fidel C.) & MABALAY (Epifanio). *Latrodectus agoyangyang*. Preliminary Notes on the Entomological, Clinical and Experimental Studies.—*Monthly Bull. Bureau of Health*. Manila. 1935. June. Vol. 15. No. 6. pp. 187-197. With 1 coloured plate.

Poisoning from spider-bite is not infrequent in the island of Cebu and probably elsewhere in the Philippines. The cause is a *Latrodectus*, distinct from *L. mactans* (the Black Widow spider) and closely allied to *L. hasselti*. Its local name is Agoyangyang, hence it is here called *L. agoyangyang*. Its entomological characters are described; when full grown the female extends its legs over about 3.5 centimetres. The body is black and red; one very similar, perhaps identical, and also poisonous is brown (instead of black) with red markings.

Symptoms following the bite are: local pain like a needle-prick, not severe, and soon after there is numbness in the legs with pain and

general weakness, followed by fullness and pain in the abdomen which becomes distended and rigid ; respiration is laboured and thirst is great. These symptoms last for 24-48 hours and then subside. Some have headache, vomiting and fever, and in fatal cases cyanosis. In one fatal case, a man of 51 years, bitten on the foot, death occurred in two days.

Experimental work was carried out on chickens, parrots, cats, dogs, guineapigs, white rats, monkeys and frogs. In all there were signs of restlessness and respiratory distress with paresis of limbs, sometimes convulsions ; diarrhoea occurred in the monkey, vomiting and salivation were marked in the dog, the vomitus becoming blood-tinged. The frog suffered from paresis and died in 2 hours, cessation of respiration preceding by some time circulatory failure. Further study of the subject is to be made.

H. H. S.

DEFICIENCY DISEASES.

LOEWENTHAL (L. J. A.). **An Inquiry into Vitamin A Deficiency among the Population of Teso, Uganda, with Special Reference to School-Children.**—*Ann. Trop. Med. & Parasit.* 1935. Oct. 5. Vol. 29. No. 3. pp. 349-360. With 1 map.

One thousand one hundred and twelve persons including 1,000 school pupils in the Teso district, Uganda, were examined for signs of vitamin A deficiency. Three hundred cases showing xerophthalmia or the characteristic follicular eruption of the skin were classified as suffering from the deficiency. The incidence in children was 30 per cent., in adults 8.7 per cent. In the dry season (December to March) the diet of the native consists of maize meal, casava, ground nuts and beer (made from millet). At other times the diet is improved by additions of sweet potato and green vegetables and it is customary to dry sweet potatoes and store them; in years when the sweet potato crop is poor, such as 1934, this is not done. The investigation showed that three months of vitamin A deficiency caused visible signs in about half of those under puberty, in a quarter of the adolescents and in only a very small fraction of adults. No signs of sex difference in incidence was noted in spite of the fact that cooked eggs (about two a week) are eaten by the men but not by the women. Economic factors play a big part in the incidence of the disease, which seems to vary inversely with the number of cattle owned in the family. The absence of other deficiency diseases was noteworthy and is ascribed to the prevalent custom of drinking beer and possibly the whey of soured milk. At present the population is only on the verge of serious vitamin A deficiency as shown by the low percentage of adults affected, the low incidence of xerophthalmia in children suffering from phrynodema and by the absence of cases of keratomalacia. A prolonged drought might produce serious effects. If it can be shown that sun-dried sweet potatoes do not lose their vitamin A, the disease can be prevented by encouraging the native to store sufficient for the dry season. Otherwise the schools offer an easy approach to the treatment of a certain proportion of the child population.

H. N. H. Green.

CHAN (Mary). **Infantile Beri-Beri in Kwangtung.**—*Chinese Med. J.* 1935. July. Vol. 49. No. 7. pp. 676-678. [Summary appears also in *Bulletin of Hygiene*.]

During 1933-34 the author met with 46 cases of infant beriberi at the Fatshan Hospital, Kwangtung Province. More than half the patients showed symptoms in the 3rd or 4th week of life. The common symptoms were vomiting, which might be severe, aphonia which was very striking, oedema (of face and extremities mainly), and absence of knee-jerk in about three-fourths of the cases. All but one were breast-fed; 27 of the mothers showed signs of beriberi and several of the remainder were ill-nourished. In 27 instances there was a history of one or more previous children having died of a similar condition.

Treatment comprised stopping breast-feeding for the first week and giving cows' milk with addition of orange juice, cod-liver oil and marmite; with older children (2 months) rice-water made from red rice. Thirty-five who were admitted were given tiki-tiki extract—severe cases 1 cc. hypodermically every 4 hours to 12 doses, then 1 cc.

by mouth, less severe cases 1 cc. three times a day. Five died within 3 days of admission; this appeared to be the critical period, after which improvement took place. Six were not traced. Vomiting was the first symptom to clear up, aphonia the last. H. H. S.

FLEISCHER (D.). De beri-beri atrophica op Zuid-Oost-Celebes. [**Atrophic Beriberi in South-East Celebes.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1935. Nov. 12. Vol. 75. No. 23. pp. 1975–1986. With 7 figs on 1 plate. [Summary appears also in *Bulletin of Hygiene*.]

An epidemic of beriberi in South-east Celebes broke out in the years 1933–34 due to failure of the rice crop, the economic depression and the consequent replacement of sago for rice in the diet of the population. By the end of 1934 this epidemic began to subside with the appearance of a good rice crop and probably also with the planting of katjang idjoe. It was noteworthy that the epidemic occurred in the sago palm region and that to the south, where sago is not eaten, there was famine but no beriberi. The number of sufferers from beriberi amounted to 3,000 out of a total population of 116,500, and 1,849 patients were admitted to the hospitals. In its main characters the disease was of the atrophic type. It began with formication; then followed some slight oedema, but pareses of one kind or another were the main feature of the outbreak. There was atrophy of muscle and of fat with consequent emaciation. Reflexes persisted for a considerable time. Nevertheless, the tendo achillis reflex, once lost, sometimes did not return even with recovery. The heart was generally compensated for the resting condition and only slight dyspnoea developed on effort, while arrhythmia was exceptional. Dilatation of the heart was manifest in 60 per cent. of the cases and the *cor bovinum* was frequently present. Only one case of acute heart death was recorded. Systolic blood pressure was normal but the diastolic pressure was always low, at times very low; it rose rapidly with treatment. In thirty cases the adrenalin reaction was tested; if the beriberi is progressive this reaction is probably always positive. In this epidemic there died 6 out of the 1,849 hospital patients, but the mortality was usually due to some complication and recovery was recorded in the 1,843 non-fatal cases. This recovery was brought about by rest and the administration of vitamins. Vitamin tablets gave better results than red rice and katjang idjoe. No cases of enterogenic beriberi occurred. Men suffered twice as frequently as women and the disease was much less among children.

W. F. Harvey.

CHOPRA (R. N.) & BHATTACHARYA (S. N.). **Observations on Epidemic Dropsy Cases admitted into the Tropical Diseases Hospital from 1922 to 1933.**—*Indian Med. Gaz.* 1935. Sept. Vol. 70. No 9. pp. 498–501. With 3 graphs. [13 refs.]

During the period 1922–33 there were 131 admissions for epidemic dropsy at the Carmichael Hospital. The greatest number in any one year was 39 in 1926; in the 1932 epidemic 23. The curve of admissions month by month shows a sharp rise from June to a maximum in August; thereafter a rapid fall till October and slower through the colder months to April. Outbreaks were most prevalent during the rains and immediately after.

As regards age, of the 131 sixteen were in the first decade, and in succeeding decades 39, 42, 22, 8, 3, 0 and 1. The age of the youngest was 2 years [in the Purulia outbreak (see following abstract) there was no patient under 4 years]. It is a disease of rice-eating people. The main symptoms are : *Oedema*, which was seen in 125 ; it was usually of solid type, especially in the early stages and tenderness and redness of the affected parts were common. *Diarrhoea*, more often noticed in severe epidemic years when more acute cases are admitted to hospital. *Fever* occurred in 94 of the 131 ; mostly of a low irregularly intermittent type, in others a low remittent. *Cardiac* symptoms with dilated heart, tachycardia, dyspnoea and even orthopnoea as a result. *Nervous* symptoms, except for pain and tenderness in the limbs, were rare. Knee-jerks were variable, not altered in 59, diminished in 2, lost in 17, increased in 39, unequal in 14. *Cutaneous* : flushing, petechial rash and sarcoids [see below]. *Ocular* : retinal engorgement, retinal haemorrhage, cupping of the disc, increased tension.

The death rate in this series was 6.8 per cent. Treatment found most efficacious comprised rest in bed with a rice-free diet, and as regards drugs tincture of *Ephedra vulgaris* with calcium lactate. H. H. S.

CHOPRA (R. N.) & CHAUDHURI (R. N.). **A Preliminary Report on an Epidemic Dropsy Outbreak in Purulia.**—*Indian Med. Gaz.* 1935. Sept. Vol. 70. No. 9. pp. 481-485. With 1 fig. [12 refs.]
INDIAN MEDICAL GAZETTE. 1935. Sept. Vol. 70. No. 9. pp. 511-512.—**Epidemic Dropsy.**

Outbreaks of epidemic dropsy have occurred at intervals since 1913, namely in that year, in 1927, 1930, 1932, 1933 and the worst in 1934. In the last it started in August and soon spread to adjacent villages, more than 2,000 persons being attacked among a population of 25,974. Further enquiry among 114 villages revealed some 5,000 cases. Thirty-five per cent. of the boys and staff of the Manbhum Victoria Institution and 113 of 450 members at the Purulia Railway settlement suffered. In 13 villages near Purulia with a combined population of 8,050 there were 825 cases, or 10 per cent. incidence.

Very few of the patients were of the poorer classes, nearly all were of the upper and middle classes. The poor labouring class lived only on freshly-husked rice ; servants of this class were affected only when they had meals at their masters' houses. In some cases all of a family were attacked, 8 out of 8, in another 9 out of 11 ; in 20 families with 121 members 74 were attacked. Although on the same diet, the members affected might show very varying grades of severity. Rice was the staple food, parboiled and mostly husked at home. The better classes would throw away the rice-water, the poorer took it with the rice. Mustard oil was also used.

For better study of the disease a Field Unit was established at Gaurangdih, near Indrabil railway station. The sexes were equally attacked, but no child under 4 years (they consume little rice). *Diarrhoea* was a common symptom, at times very severe, almost choleraic ; palpitation and dyspnoea were present ; the oedema appeared first in the legs, over the lower third of the tibiae, rarely involving the thighs and hands, and never the trunk or face. In 14 patients a macular or erythematous rash was observed on the inner aspect of the thighs [see below]. Abortion always occurred when pregnant women were attacked. The most successful treatment was a rice-free diet, rest,

and administration of tincture of ephedra, 20–30 minims with calcium lactate 10 grains, b. or t.d.

In an appendix to this paper is a brief account of an outbreak in an engineering camp of Hindus and Mohammedans at Purulia. Forty-six of 55 Hindus were attacked, but none of 7 Mohammedans. They mixed freely with each other and used a common water supply; in fact the only difference was that the food was supplied by different contractors, and the rice of the Hindus was heavily infected with bacteria of the "vulgatus" group, that of the Mohammedans being free.

H. H. S.

CHOPRA (R. N.); CHAUDHURI (R. N.); PANJA (D.). **Cutaneous Manifestations of Epidemic Dropsy. Part I. A Clinical Study** [CHOPRA & CHAUDHURI].—*Indian Med. Gaz.* 1935. Sept. Vol. 70. No. 9. 493–496. With 4 coloured plates. **Part II. A Histopathological Study** [CHOPRA, CHAUDHURI & PANJA].—*Ibid.* pp. 496–498. With 11 figs. on 2 plates.

A study of the cutaneous manifestations of this disease, first from the clinical and second from the pathological aspect. The authors describe in detail four cases, met with in the last four months of 1934, in whom different types of cutaneous symptoms were observed. In the first there were vascular nodules, 51 in all, some sessile, a few pedunculated, scattered over the trunk and limbs; in the second was a generalized erythema, but no sarcoids; in the third, small red nodules in various parts of the body, mottling of thighs and legs, and 7 sarcoid growths; in the fourth a rash on the legs and increased pigmentation of the face. In their summary the authors state that the pigmentation is a new feature calling for further investigation.

As regards treatment, none is needed for the rash and the pigmentation; they clear up as the patient recovers. The sarcoids bleed readily and though the haemorrhage is checked by pressure it is liable to recur. If small, CO₂ snow stops the oozing and brings about their drying up; if large, they are better removed under novocaine.

In the second paper the histological appearances are described, first of the simple erythema and oedema; next of the sarcoid in an early stage, and then, in order, of the nodular, the fungating or ulcerative types and of the healing sarcoid. For details the original must be consulted.

The first part is illustrated with coloured plates showing well the various skin manifestations; the second with photomicrographs.

H. H. S.

DE (Manindra Nath) & CHATTERJEE (Krishnadhan). **Nodular Eruptions in Epidemic Dropsy.**—*Calcutta Med. Jl.* 1935. Apr. Vol. 29. No. 10. pp. 521–538. With 16 figs. (7 coloured) on 14 plates.

The "nodular eruptions" of epidemic dropsy have been described and figured [see e.g., this *Bulletin*, Vol. 25, p. 437; Vol. 28, pp. 462–3.]

Here are vivid presentations of them on plain and coloured plates, and a description of 9 cases. In the recent epidemic in Bengal the development of superficial cutaneous nodular eruptions has been the dominating feature; nodules on mucous membrane have also been

noted. They do not inconvenience the patient but may bleed uncontrollably. Photomicrographs show the presence of a large number of capillary blood vessels in loose areolar tissue ; there is no inflammation.

A. G. Bagshawe.

[It might be interesting to examine for Bartonella ; there seem to be some points of resemblance between the above and Verruga.—ED.]

DE (M. N.) & CHATTERJEE (K. D.). **Pathology of Epidemic Dropsy.**—*Indian Med. Gaz.* 1935. Sept. Vol. 70. No. 9. pp. 489-493. With 6 figs. (3 on 1 plate).

In this account of the morbid anatomy and histology of the lesions found in patients dying of epidemic dropsy particular attention is given to the cutaneous lesions. The erythema referred to in the preceding abstract is due to vascular dilatation and may occur elsewhere than in the lower limbs. Ecchymotic patches may be seen and consist not of haemorrhage but of telangiectases. Nodular excrescences are found, developing 3-6 weeks after the first symptoms ; they may be numerous, 100 or so, or solitary, usually about a dozen and do not appear to bear any relation to the severity of the attack. They may be sessile or pedunculated, of a size from a pea to a lemon, usually quite small ; they bleed readily. They arise in the superficial layer of the cutis vera in the skin papillae and contain dilated vascular spaces. They may occur anywhere on the skin, and also on the mucosa of the mouth, tongue, nose.

Other lesions to be noted are dilatation of the heart with thinning of the muscle walls and separation of the fibres by dilated capillaries. A distressing complication occurring in 10-12 per cent. of patients was a glaucoma developing some weeks after the primary manifestations. No abnormality could be recognized in the spinal cord or peripheral nerves, though the cord membranes might show marked vascularity. Fatal cases are not numerous and there is need for further study of the pathology of this condition.

H. H. S.

CHATTERJEE (Hemendra Nath) & HALDER (Monindra Nath). **Haematological Studies in Epidemic Dropsy.**—*Calcutta Med. Jl.* 1935. July. Vol. 30. No. 1. pp. 1-15. With 4 plates (2 coloured). [25 refs.]

The authors carried out these haematological studies on 45 cases of epidemic dropsy during the outbreak of 1934. They determined the total red and white cell counts, the haemoglobin, the differential leucocyte count, the reticulocyte count and the presence of abnormal cells.

The total erythrocyte count was not much reduced ; in a mild case the lowest was 3·8 millions and in a severe case 3·0 ; the leucocyte total is increased in the early stages to 9,000-10,000, later is about or a little above normal, 7,100-7,900. The haemoglobin in a mild case may fall to 11 gm. per 100 cc. (the normal average being 14·5) and in a severe case to 7·5 gm. According to the severity of the disease the Arneth count shows a shift to the left. As regards the differential leucocyte count the lymphocyte percentage is a little raised, the eosinophile considerably, at the expense of the neutrophiles, and the eosinophilia appears to become greater as the clinical state improves. The reticulocytes are not increased as a rule. So-called toxic cells increase with progress of the disease and diminish with convalescence.

"Toxic cells are characterised by vacuolisation of the protoplasm and the appearance of coarse basophil granules in place of the fine neutrophilic ones in the polymorphonuclear cells. The toxic cells are not present in the normal blood; their appearance has been regarded as a sign of toxæmia and their continued and sustained increase indicates a very bad prognosis. The toxic cell index has been expressed by the following formula:—

$$\frac{\text{Toxic polymorphonuclear cells}}{\text{Total polymorphonuclear cells}} = \text{Toxic cell index.}$$

The result is finally expressed in per cent. relation to the total polymorphonuclear cells."

H. H. S.

DE LANGEN (C. D.) & DJOHAN (Bahder). Pellagra in Nederlandsch-Indië. [**Pellagra in the Netherlands Indies.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1935. Apr. 16. Vol. 75. No. 8. pp. 659-662. With 3 figs. on 1 plate. English summary (3 lines).

The case described is typical; the patient a native of Batavia, 35 years of age, emaciated, anaemic, with atrophic glossitis, mental depression, slight oedema of legs and sores on the dorsum of each foot, roughening of the hands, etc. Blood examination showed red corpuscles 2,156,000 per cmm. Hb 35 per cent., C.I. 0.8. The case is recorded because pellagra is said to be very rare in the Netherlands Indies.

H. H. S.

SPIES (Tom D.). **The Treatment of Pellagra.**—*Jl. Amer. Med. Assoc.* 1935. Apr. 20. Vol. 104. No. 16. pp. 1377-1380.

"It is shown in the present study that the severely diseased pellagrin can usually be cured of his disease, provided he receives sufficient amounts of a potent specific therapeutic agent, adequate rest, food and nursing care. In many instances treatment of the complications and coexisting diseases is essential."

The author has shown that notwithstanding all the patients of a first series were treated in hospital with a highly nutritious diet 54 per cent. of 73 died; in the present series of 125 the fatality rate was reduced to 6 per cent. [but it is stated that one-third relapsed and each readmission was treated as a separate case]. He says that the successful treatment is governed by the rigid application of certain general and specific therapeutic measures, which he describes under the heads, general principles, specific therapeutic agents and treatment of special symptoms.

The general principles of treatment include sufficient rest, and bed for those who are severely ill; often large doses of sedatives; a well-balanced diet of 4,000 calories or more a day; supervision of every detail of diet by the physician; food lost through vomiting or diarrhoea to be made up; good nursing.

The specific therapeutic agents are yeast, desiccated hog stomach, wheat germ, liver extract. Of yeast must be given 75-100 gm. of the dry powder daily, unless there is persistent vomiting or diarrhoea when one of the other agents must be substituted. It is tolerated best at intervals of 3-4 hours in iced milk or iced egg nog.

For desiccated hog stomach (ventriculin) the indications are the same as for yeast; it has not the same laxative properties; 200 gm. is taken daily in the same way. Wheat germ is given in amounts

between 250 and 300 gm. daily. Liver extract may be given orally or parenterally. "The oral administration of 75 to 100 gm. each day rapidly cures the great majority of patients with pellagra," but in patients with persistent vomiting, intractable diarrhoea or severe stomatitis it must be injected daily in 3-5 doses of 20 cc. each. Parenteral injection of liver extract and the simultaneous administration of large amounts of specific antipellagrous materials by mouth is the most successful plan.

For the treatment of special symptoms—*viz.*, stomatitis and glossitis, diarrhoea, abdominal pain, involvement of nervous system, anaemia, dermatitis, the paper must be consulted. Stomatitis occurs in 50 per cent. of severe cases, and disappears when the diet is adequate. 60 per cent. have diarrhoea, which may need tincture of opium; when recovery starts diarrhoea lessens. Two-thirds have persistent vomiting, treated with small amounts of iced fluids. Two-thirds have nervous system involvement or peripheral neuritis or both. The mental symptoms nearly always improve with time though the use of the stomach tube to ensure adequate nourishment, and sedatives may be necessary. Anaemia is best treated in the convalescent period and is cured either by an adequate diet or by iron. The dermatitis heals easily and so cannot be used for prognosis.

To prevent return of the disease the author advises a quart of milk and 6 oz. of lean beef as supplements to the diet, with turnips, tomatoes and green peas. The author was treating 8 patients with delirium tremens and no pellagra at the same time. Both conditions follow chronic alcoholism and the neurologic signs and symptoms were clinically indistinguishable; it seems therefore possible "that the nervous system of the patient with delirium tremens may be involved in a manner somewhat similar to that of the pellagrin who has mental symptoms." Three of 8 pellagrins who died had cirrhotic changes in the liver, and the author notes that 95 per cent. of them "imbibed heavily of alcoholic beverages."

A. G. Bagshawe.

SHARP (N. A. Dyce). **A Note on a Nutritional Disease of Childhood.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. Jan. 25. Vol. 28. No. 4. pp. 411-412.

CARMAN (John A.). **"A Nutritional Disease of Childhood."** [Correspondence.]—*Ibid.* Apr. 17. No. 6. pp. 665-666.

STONES (R. Y.). [Correspondence.]—*East African Med. Jl.* 1935. July. Vol. 12. No. 4. pp. 113-114.

These letters concern a disease, or diseases, in small children described by WILLIAMS from the Gold Coast [this *Bulletin*, 1934, Vol. 31, p. 344] and by GILLAN in East Africa [this *Bulletin*, 1935, Vol. 32, p. 71; see also p. 526] and now stated to occur in Uganda.

The chief features seem to be oedema of the extremities, peeling of the skin and irritability; the issue is usually fatal. In East Africa the passage of large pale greasy stools is noted, and depigmentation of the hair. A vitamin deficiency is suggested by some. A. G. Bagshawe.

STANNUS (Hugh S.). **"Kwashiorkor."** [Correspondence.]—*Lancet.* 1935. Nov. 23. pp. 1207-1208.

Dr. Stannus discusses the disease of West Africa designated Kwashiorkor [see *Bulletin of Hygiene*, 1936, Vol. 11, p. 311] and recorded by

Dr. Cicely WILLIAMS. He takes in turn the main points held as distinguishing this disease from pellagra, and demonstrates that they are not valid differences but that the clinical picture of Kwashiorkor is that of pellagra as it affects infants. H. H. S.

RATTNER (Herbert). **Burning Tongue.**—*Arch. Dermat. & Syph.* 1935. May. Vol. 31. No. 5. pp. 701-702. [Summary appears also in *Bulletin of Hygiene.*]

Burning tongue is a symptom, not infrequently an early symptom, of avitaminoses or diseases associated with diet deficiencies. Among the conditions in which sore or burning tongue is complained of may be mentioned sprue, pellagra, decoqué in Seychelles, A and B avitaminosis in West Africa, "peripheral neuritis" (so-called) in Jamaica. The following account is therefore both interesting and instructive, in that the cause is one which may easily be overlooked and in this case actually was overlooked for several years. The patient had consulted many physicians on account of this symptom, who not finding any definite cause, came to the conclusion that it was psychoneurotic. The presence of two amalgam fillings and on the other side three gold inlays caused discomfort and a metallic taste and a micro-ammeter indicated that a distinct current was generated by the dissimilar metals. It was owing to this metallic taste that the patient had the amalgam fillings replaced by gold and the relief of the burning which had troubled her so long was prompt. The moral is clear; when a patient complains of burning tongue do not omit examination of dentures. H. H. S.

REVIEWS AND NOTICES.

SVENSSON (Ruth). **Studies on Human Intestinal Protozoa especially with Regard to their Demonstrability and the Connexion between their Distribution and Hygienic Conditions.**—*Acta Med. Scandinavica*. 1935. Supp. 70. pp. x+115. With 13 figs. on 2 plates & 1 graph. [104 refs.]

This monograph is in many respects an amplification of a paper previously published by the author (this *Bulletin*, 1935, Vol. 32, p. 220). It describes with meticulous detail certain surveys carried out chiefly amongst the general population and mental hospital patients in Sweden, with a view to determining accurately the incidence of intestinal protozoal infections. Three methods of examination were carefully compared as regards the accuracy of the results obtained. These were the examination of formed stools, the examination of liquid stools following the administration of magnesium sulphate and the application of culture methods to liquid stools. Though the examination of formed stools revealed a few infections not discovered by the other methods, it became clear that the combination of the direct examination and culture of the liquid stools gave practically all the infections noted. The actual methods of carrying out the various procedures employed are fully described and discussed and the findings obtained are carefully analysed and compared. The results arrived at can only be appreciated by reading the whole work but one or two of the more important points can be referred to here. From the purely practical point of view it is clear that the single examination of the liquid stool following a saline purge will reveal the majority of the infections and that it is only by repeating examinations and combining these with cultures, proceedings which are hardly practicable in ordinary work, that all the infections will be discovered. It is noted that a rural population gave a higher incidence of infection with all species of intestinal protozoa than did a group examined in Stockholm, while amongst mental hospital patients there was found a higher incidence than both these groups had given. It was also noted that amongst the patients the incidence increased with the length of residence in hospital, the recent arrivals giving figures no higher than those obtained from the normal population. This finding once again indicates the association of high incidence of intestinal protozoal infections with lack of cleanliness and sanitation. As regards the general population the results obtained are very similar to those which have been given for England and Germany. It is of interest to note that a group examined in Helsingfors gave a higher incidence than did the normal population of Sweden. Of the individual species found the three amoebae, *E. coli*, *E. nana* and *E. histolytica*, gave fairly regularly the highest figures. A notable feature was the unusually high percentage of infections with *Dientamoeba fragilis* and *Enteromonas hominis* amongst the mental hospital patients. It was also revealed that infections with *E. coli* and *E. nana* persist longer in an individual than do infections with *E. histolytica*, *Iodamoeba* and *Chilomastix*. Anyone contemplating carrying out similar surveys is advised to read carefully the account of work recorded in this monograph.

C. M. Wenyon.

ACADEMY OF SCIENCES OF THE USSR. Travaux de la Filiale de l'Académie des Sciences de l'URSS au Tadjikistan. Vol. 5. [Zoology and Parasitology.]—480 pp. With numerous illustrations. 1935. Leningrad. [In Russian.]

This volume, dedicated to Prof. E. N. Pavlovsky, contains a collection of papers devoted to the parasitic and free-living fauna of Tadjikistan (Middle Asia). Since it is impossible to review all the papers only a brief survey of the contents of those that have a bearing on tropical medicine and parasitology will be given. P. P. PERFILIEV and V. B. POPOV (p. 15) contribute an article on the bionomics of the sandflies (*Phlebotomus papatasi* and *P. sogdianus*) of Kuljab; another paper by P. PERFILIEV deals with "The biology, systematics and distribution of sandflies of the group *major*" (p. 29). The incidence of intestinal protozoa among the native population of Tadjikistan is reviewed by V. G. GNEZDILOV (p. 53). V. P. PETROV (p. 61) writes on the incidence and epidemiology of kala-azar in Tashkent. G. G. SMIRNOV (p. 95) reviews the data on "Haematophagy among parasitic nematodes;" L. F. PARADOXOV (p. 119) describes two cases of echinococcosis of the human orbit. G. J. ZMEEV (p. 125) contributes a paper on the epidemiology of helminthic infections in Tadjikistan. V. L. JAKIMOFF [= W. L. YAKIMOFF], V. S. BELAVIN and S. I. NIKOLSKY (p. 151) discuss the question of cattle anaplasmosis in the Soviet Union. They recognize two species, *Anaplasma marginale* and *A. rossicum* and compare the symptoms with those in the North African cases. A paper by I. G. GALUZO, I. A. TSHETAEV and V. M. BESPALOV (p. 167) deals with the piroplasms (*Piroplasma bigeminum*, *Françaiella colchica* and *Theileria annulata*) of the cattle in the Valley of Gissar. In another paper I. G. GALUZO (p. 187) incriminates the tick, *Hyalomma detritum rubrum*, in the transmission of cattle theileriosis. I. G. GALUZO and V. M. BESPALOV (p. 199) recommend the transfer of cattle to mountain pastures in summer as a prophylactic measure against piroplasmosis.

M. V. POSPELOVA-STROM (p. 205) gives a systematic account of ticks of the genus *Haemaphysalis* (with a German summary).

The remaining papers are devoted to the free-living fauna of Tadjikistan. C. A. Hoare.

ALL-UNION INSTITUTE OF EXPERIMENTAL MEDICINE (VIEM). **Parasites, transmetteurs, animaux venimeux.** [Parasites, Vectors and Poisonous Animals.] Recueil des travaux dédié au 25-me anniversaire scientifique du Professeur Eugène Pavlovsky (1909–1934). pp. viii+452. With numerous illustrations. 1935. Moscow. [Roubles 17-50.]

This book is dedicated to Prof. E. Pavlovsky, of the Military Medical Academy in Leningrad, on the occasion of the twenty-fifth anniversary of his scientific career devoted to various branches of parasitology, the advancement of which in Russia is largely due to the wide erudition and untiring energy of Prof. Pavlovsky.

The jubilee volume comprises a series of papers on parasites, vectors and poisonous animals, contributed by Prof. Pavlovsky's admirers, collaborators and pupils, both in Russia and in other countries. The papers appearing in Russian are all provided with summaries in some foreign language, while those written by foreign authors are in their native language.

Since in a short review it is impossible to do justice to the wide scope of subjects dealt with in this book the following titles of some of the papers bearing on tropical medicine and parasitology are given for bibliographical purposes:—

- BRUMPT, E. "Etude historique concernant l'étiologie de la fièvre récurrente sporadique de l'Asie." (p. 41).
- ALIMOV, A. "Fièvre récurrente de Perse." (p. 54).
- SERGEANT, Edm. et ET., et PARROT, L. "Insectes et maladies en Afrique du Nord." (p. 68).
- KLIMENTOWA, A. A. et PERFILIEW, P. P. "Punaises, puces et tiques comme transporteurs du virus du typhus exanthématique dans les conditions expérimentales." (p. 71).
- BYTSCHKOW, W. "Du rôle joué par les puces dans la conservation et la propagation du virus de la peste." (p. 89).
- EPSTEIN, H., SILVERS, I., and EXEMPLARSKAJA, E. "Rat fleas as Carriers of Experimental Pneumococcus Infection." (p. 129).
- EPSTEIN, H., SILVERS, I., and EXEMPLARSKAJA, E. "Bed-bugs as Carriers of Experimental Pneumococcus Infection." (p. 138).
- OLSUFIEV, N. und LELEP, P. "Ueber die Bedeutung der Bremsen bei der Verbreitung des Milzbrandes (Anthrax)." (p. 145).
- PARROT, L. "Les éléments de diagnose spécifique des Diptères du genre *Phlebotomus* (Psychodidae)." (p. 198).
- PETRISTCHEVA, P. A. "Faune, biologie et écologie des Phlébotomes de la Turcomanie." (p. 202).
- NATVIG, L. R. "*Hypoderma lineatum* als fakultativer Parasit eines norwegischen Mädchens." (p. 272).
- FAUST, E. C. "Host-Tissue Reaction in Schistosomiasis *Mansoni*." (p. 287).
- WARD, H. "The Longevity of the *Diphyllbothrium latum*." (p. 288).
- MOSCHKOVSKY, S. D. "Beobachtungen an der Wuchereriosis in Arabien." (p. 295).
- SMIRNOV, G. G. "Nutrition of the *Ascaris* Larvae in the Process of Migration." (p. 298).
- SONDAK, V. "Resistance of the Eggs of the Broad Tapeworm and *Enterobius vermicularis* to Chemicals." (p. 307).
- SONDAK, V. "Cockroaches as Carriers and Hosts of Parasitic Worms in Leningrad and Suburbs." (p. 316).
- TALYSIN, T. "Contribution to the Morphological Characteristics of the Strobila of *Diphyllbothrium minus* Chol." (p. 328).
- STROM, J. "Helminthiasis among the Northern Nations." (p. 334).
- STROM, J. and SONDAK, V. "Some new and little-known Trematode Worms belonging to the Families of the Plagiorchiidae and Dicrocoeliidae." (p. 348).
- HOARE, C. A. "The Development of Trypanosomes in Tse-Tse Flies in Relation to the Peritrophic Membrane." (p. 367).
- DOGEL, V. und GNESDILOFF, W. "Zur Frage über die Nahrung und Nahrungsspeicherung bei *Balantidium coli*." (p. 377).
- PIRUMOW, C. N. "Die Wandlungen der Malariaparasitenfauna in Sow. Armenien." (p. 389).
- EPSTEIN, H. "Contribution à l'étude des hémoparasites de *Petromyzon marinus*." (p. 398).
- PRISALIX, M. "Les venins dans la thérapeutique moderne." (p. 409).
- PAVLOVSKY, E. N. und DUNAJEWA, Z. W. "Grundlegende Richtungen der Untersuchung der Helminthentoxine und Angaben über die Wirkung des Extraktes von *Diphyllbothrium latum* auf das isolierte Katzenherz." (p. 416).
- PAVLOVSKY, E., STEIN A., and OLSUFIEV, N. "Experimental Investigation of the Action of the Saliva of Gadflies on the Skin." (p. 426).

C. A. Hoare.

REUTER (Johannes). **Oriënteerend onderzoek naar de oorzaak van het gedrag van *Anopheles maculipennis* Meigen bij de voedselkeuze.** [Study of the Behaviour of *Anopheles maculipennis* as regards Choice of a Food Supply.] [Thesis for Doctorate of Science at Leiden University.]—118 pp. With 6 figs. [98 refs.] Discussion of the Results in English. 1936. Den Haag: N. V. Electrische Drukkerij "Luctor et Emergo."

It is generally held that the races of *Anopheles maculipennis* differ from one another in their avidity for human blood. The author has endeavoured to subject this view to experimental tests.

A considerable part of the experimental work was carried out with an "artificial arm," which was a glass tube through which warm water was circulated. It was generally covered with filter paper and introduced into a cage of mosquitoes, observations being made on the insects' attempts to bite it. Working mainly with *A. maculipennis* var. *atroparvus*, the author showed that the most important stimulus is provided by the temperature of the artificial arm, which is not attractive unless it is at 28°C. or a higher figure [the temperature of the cage not being stated]. Provided the temperature is at 28° or above, the wet filter paper was more attractive than dry [though we must demur to the statement that they were of the same temperature, for evidently the wet filter paper would be the colder unless the air was saturated at the temperature of the artificial arm]. The author found that paper wet with sweat or cotton rubbed on the surface of a pig, was not more attractive than wet paper; if the paper were wetted with blood it became more attractive than paper and water.

The author then evolved a large elaborate piece of apparatus which consisted of a cage of mosquitoes in the centre, communicating with a large box on either side. He performed a number of experiments such as putting a man to sleep in one box and a pig in the other and counting the mosquitoes, both those full of blood and others, in the morning. This experiment appeared to show that the choice of the mosquito is determined by such things as temperature and humidity, rather than by the species of host. This view is interesting, but it should have been subjected to precise proof or disproof by taking adequate measurements of the climatic factors concerned. So far as the reader of the English discussion can discover no adequate steps were taken to measure these factors.

P. A. Buxton.

THE BRITISH FILM INSTITUTE. **Catalogue of British Medical Films of Technical Interest to Medical Practitioners and Students.**—48 pp. London: 4 Great Russell Street, W.C.1. [1s.] [Review appears also in *Bulletin of Hygiene*.]

This Catalogue, which has been compiled by the Medical Panel of the British Film Institute, supplies a need which has long existed and should do much to encourage the use of cinematography for educational purposes. The International Institute of Educational Cinematography, with the assistance of the Health Section of the League of Nations, is preparing an encyclopaedia of medical films produced both at home and abroad and this Catalogue constitutes the first step taken in this country towards international collaboration on the subject.

Information has been collected respecting films in existence at medical schools and universities, and many owned by other bodies and

individuals have been examined and added to the list. It is realized, however, that a number have still to be included and it is hoped that these will be brought to the notice of the Medical Panel of the British Film Institute as soon as possible. It is intended, with the help of the Colonial Office, to supplement the Catalogue from time to time by incorporating films produced in the Dominions and Dependencies.

The "Catalogue of British Medical Films" is not a guide as to the quality or to the value for teaching purposes of each film included, but it is a well-classified list of British films, and information is given in each case with regard to title, date, author, width, silent or sound, and suitability and the name and address of the owner. It is well arranged and has a very good index of both authors and subjects and should be most useful to all persons anxious to develop in this country a system of education which deserves far more attention than it has hitherto received.

[Some 200 films are catalogued, the list being confined to British films—a limitation that explains the omission of many medical films of foreign authorship to be seen in Great Britain, such as the films of Malaria and Hookworm Disease issued by the British Medical Foundation. The Kodak Co. have also published a catalogue of the Medical Film Library in which titles of 150 films are given, some of tropical interest.]

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

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TYPHUS AND ALLIED FEVERS.

BOYD (J. S. K.). **Fever of the Typhus Group in India. An Analysis of One Hundred and Ten Cases reported in 1934.**—*Jl. Roy. Army Med. Corps.* 1935. Nov. & Dec. Vol. 65. Nos. 5 & 6. pp. 289-305; 361-367. [14 refs.]

This important paper is a result of the recent issue to all laboratories in India of standardized emulsions of *Proteus O* antigens.

Since the beginning of the year 1934 detailed records of all cases of fever of the typhus group have been submitted to Headquarters and have been analysed.

In 1934, 110 cases of fever were reported; in all these cases blood culture was negative for bacteria of the enteric group. It is also interesting to record that although careful investigations were made no strains of *Proteus* could be isolated either from the blood or urine of any of these patients. As regards the results of the Weil-Felix reaction a titre of 1/100 or over was taken as positive, and of 108 cases fully investigated

43 cases showed preponderance of *XK* agglutinins.

14	"	"	"	"	<i>X2</i>	"
51	"	"	"	"	<i>X19</i>	"

Tables are given showing the distribution of the cases by Commands and Districts, seasonal incidence and results of the Weil-Felix reaction. The cases have been placed in three categories or groups in accordance with the results of the agglutination reactions and the clinical evidence. Thirty-five cases in which *XK* agglutinins predominated are grouped together and it is notable that in these cases the reaction for *XK* was clear and definite and there were practically no coagglutinins for *Proteus X2* or *X19*. The majority of these cases occurred in August and September just after the monsoon; this was true whether the cases occurred in the Northern, Southern, or Eastern Commands. As regards the clinical features of the cases in this group they were typical of typhus group fevers but the rash was not well marked and was evanescent and indeed not detected at all in many of the cases, and in distribution was confined to the trunk only.

Fourteen cases in which *X2* agglutinins predominated were investigated; these cases were limited to the Deccan and the Poona district and occurred during November and December. The rash in these cases

was a prominent feature, resembling the rash in boutonneuse fever, and consisted of macules, papules and petechiae; the distribution was general and included the face and palms and soles; although *X2* was the predominant agglutinin in this group co-agglutinins for *XK* and *X19* were also present, and the reaction was in the nature of a group reaction rather than a main agglutinin.

The 51 cases in which *X19* agglutinins predominated could be divided into 3 groups: (1) 16 cases from Poona which were clinically identical with the *X2* cases described above; (2) a group of 27 cases from Bangalore which clinically and serologically (*X19* main antigen) resembled endemic typhus; (3) 8 other cases scattered about the country, some of which resembled the *X2* type, some the *X19*, and some neither. In none of these 110 cases was it possible to incriminate any insect vector, and the author deprecates the use of the diagnosis "Indian tick typhus," a name he says which has given rise to confusion and so far is without any direct scientific proof to support it.

	<i>XK</i>	<i>X2</i>	<i>X19</i>	
			Poona	Bangalore
Geographical Distribution	Northern, Southern & Eastern Commands	Deccan & Poona District only	Deccan District & Poona	Southern Command except Poona
Seasonal Incidence	Maximum Aug. & Sept.	Maximum Dec.	Maximum Dec.	All year round except Feb.-Apr.
Rash— No. of cases*	Br. 15/21 Ind. 1/14	Br. 8/8 Ind. 5/6	Br. 10/10 Ind. 6/6	Br. 5/6 Ind. 1/21
Day of appearance	5th or 6th	3rd-4th 3rd-10th	3rd 7th	4th-10th 8th
Type ...	Flush + macules	Macules, Papules, Petechial	Macules, Papules, Petechial	Maculo-papular
Distribution	Trunk only	Generalized	Generalized	4 cases trunk only 2 cases trunk and limbs
Duration of rash ...	7 days	Br. 18.4 Ind. 14.4	Br. 25 Ind. 10.5	Br. 4 Ind. 3
Staining ...	Nil	Br. + in some cases	Br. + in some cases	
Duration of Pyrexia ...	14.2 days	12.5 days	15.5 days	10.4 days
<i>Proteus</i> agglutinins ...	<i>XK</i> +++ <i>X2</i> — <i>X19</i> —	<i>XK</i> ± <i>X2</i> +++ <i>X19</i> ±	<i>XK</i> ± <i>X2</i> ± <i>X19</i> + to ++	<i>XK</i> ± <i>X2</i> ± <i>X19</i> +++

* Numerator = number of rashes, denominator = number of cases.
Br. = British. Ind. = Indian.

Summary.—(1) A definite *XX* group is described corresponding closely to Malayan scrub typhus; (2) It is suggested that there are also 2 other types of typhus in India, one having as its main antigen an unknown strain of *Proteus* and resembling Rocky Mountain fever, and the other with *X19* as its main antigen and resembling endemic typhus.

D. Harvey.

COVELL (G.). **Studies on Typhus in the Simla Hills. Part I. Introduction. Part II. The Weil-Felix Reaction in Wild Rats. Part III. A Strain of Typhus recovered from Wild Rats.**—*Indian Jl. Med. Res.* 1936. Jan. Vol. 23, No. 3. pp. 701–708. [67 refs.]; 709–712; 713–720. With 2 figs. on 1 plate.

I. The introduction of this paper consists of an interesting historical account of the typhus group of fevers in general and of typhus fevers in India in particular.

The author emphasizes the fact that there are two distinct types of the typhus group of fevers in Kasauli, one type, the sera of which agglutinate *Proteus OXK*, occurs during and after the rains, August, September, October, the other type, the sera of which agglutinate *Proteus OX19*, occurs in the winter and in the early spring. [See this *Bulletin*, 1935, Vol. 32, p. 572.]

II. Taking 1/50 as a standard positive reaction for *Proteus OX19* and 1/125 as standard for *Proteus OXK*, 22 rats or 4.2 per cent. out of 500 examined gave a positive reaction.

It is interesting to note that if the rate is calculated by areas the ratio of rats giving a positive reaction in areas where cases of typhus had occurred is nearly double the rate in rats captured elsewhere.

III. Emulsions were made of the brains of rats and inoculated intraperitoneally into guineapigs and intraocularly into rabbits. It was not possible to isolate a virus by this latter method but in 2 out of 5 rabbits a positive Weil-Felix reaction was obtained. In 2 out of 30 guineapigs inoculated fever resulted and in one was accompanied by scrotal reaction. This infection has now been passaged for 10 generations and in each instance has resulted in fever after an incubation period of 4 to 10 days and in the case of male guineapigs accompanied by scrotal reaction in 63 per cent.

Rickettsia could be readily demonstrated in smear preparations made from the tunica of guineapigs and also from white rats.

Thirteen white rats, 7 rabbits and 2 monkeys gave positive Weil-Felix reactions for *Proteus OX19* and one rabbit gave a positive reaction for *Proteus OXK*. The 3 rats from which this virus was actually isolated gave the following Weil-Felix reactions.

				<i>OX19</i>	<i>OXK</i>
Rat	397	...	...	100	45
„	399	...	...	50	250
„	402	...	...	100	70

The virus was therefore probably mixed from the 2 varieties. Although it has not yet been possible to test the immunity of the animals infected with this virus against a known virus of typhus there can be little doubt that a typhus virus has been isolated from rats in India.

D. H.

SHORTT (H. E.) & D'SILVA (H. A. H.). **The Distribution of Indian Tick Typhus with Notes on Laboratory Findings.**—*Indian Med. Gaz.* 1936. Jan. Vol. 71. No. 1. pp. 13-21. With 1 map & 6 charts. [32 refs.]

The author gives a table of 117 cases of the typhus-like fevers which have been recorded in India in recent years, these cases are not confined to any one area but occurred all over the country. The general inference is that these cases occur in the summer in the hills and the winter in the plains [but COVELL has pointed out that in Kasauli one type of typhus occurs during and just after the rains, August, September, October, and another type occurs in the winter and early spring].

Four cases of typhus fever, OXK type, vector unknown, were investigated by the authors; unfortunately none of the 4 cases came under investigation until in the late stages of the fever. Blood was taken from these patients and inoculated into experimental animals—guinea-pigs, rats and rabbits; 120 animals in all were employed.

It was not possible to isolate a typhus virus from any of the animals, but of 28 guineapigs 2 developed fever and 6 out of 8 rats after a definite incubation period, the infection, however, could not be passed on to other animals nor was it possible to test for immunity to a typhus virus. Of 3 rabbits inoculated one showed a rising and falling titre of agglutination for *Proteus* OXK.

It has been suggested that the grey palm squirrel, a recent arrival in the hills, may be the reservoir of a typhus virus. Sixty-five of these animals were captured locally and their sera tested; 55 per cent. gave a positive reaction of 1/25 or higher for OXK whereas only 20 per cent. of squirrels captured in the plains gave a positive reaction. An examination of these squirrels showed that the hill squirrels were harbouring fleas and the plain squirrels lice.

D. H.

O'CONNOR (M. P.). **Typhus Fever with Special Reference to its Occurrence in Malaya.**—*Malayan Med. Jl.* 1935. June & Sept. Vol. 10. Nos. 2 & 3. pp. 25-38; 78-99. With 6 figs., 1 map & 8 charts. [107 refs.]

This able paper is divided into 2 sections; the first dealing with the historical aspect of typhus fevers generally and with typhus fevers in Malaya in particular. There is nothing special to note in this section except that the author emphasizes again the close relationship, as regards epidemiology and serology, between scrub typhus and Japanese River fever; indeed his conclusion is that Japanese River fever in Malaya is scrub typhus *plus* the primary sore [would it not be more correct to say that scrub typhus is Japanese River fever *minus* the primary sore?]. As the author states, most of the publications dealing with these fevers in Malaya have hitherto been concerned with the laboratory side and the clinical side has been neglected. The second section of the present paper contains a very full and detailed clinical description of 86 cases of scrub typhus which came under the care of the author in the General Hospital of Kuala Lipis in Central Malaya. Most of these cases occurred among people who were employed in clearing overgrown rubber plantations or pruning the palms and also among people, mostly Chinese, engaged in working over abandoned surface mines; all are occupations which caused disturbance of rats and their ectoparasites. Twenty-one cases occurred

in 1932, 21 in 1933 and 44 in 1934. Of the 86 cases 33 were Tamils, 28 Chinese, 19 Indians, 1 Malay, 5 Europeans, but the main factor was occupational. The death rate in this series was 4.7 per cent.

As regards the incubation period this could be definitely determined in one case at least as 13 days but was generally determined as from 10 to 21 days. The onset was usually abrupt and the general fever curve differed from that of true typhus in that there were daily remissions and in some cases actual intermissions of the fever. The duration of the fever varied from 10 to 20 days. The rash appeared on the 5th or 6th day and was difficult to see in natives and as a rule was ill defined, appearing first on the back and chest, in no case did it involve the palms or soles. Headache and sleeplessness were constant symptoms, the pulse was slow in relation to the fever, cough was usually present and mild delirium in some cases. Recovery was rapid after the fever ceased.

The differential diagnosis is discussed. Typhoid fever presents difficulties but blood culture should help and there are differences in the rashes; also the common appearance of enlarged glands in scrub typhus (62 per cent. of this series) is a differential point, as is also the increased rate of respiration which was present in all cases of the series.

The Weil-Felix reaction is of course a great help in diagnosis but is not so useful in scrub typhus as it is in true typhus owing to the fact that it does not as a rule appear until the fever has ceased, whereas the chief difficulty of diagnosis arises in the early days of the fever.

As regards the Weil-Felix reaction in the present series all but 2 gave a positive reaction with *Proteus* XK.

38 cases	were positive in	1/200	to	1/500
21	"	"	1/500	" 1/1,000
18	"	"	1/1,000	and over

One case gave a positive reaction up to a dilution of 1/28,000.

The maximum titre was obtained as a rule on the 17th day of the illness. Certain typical cases are selected and full notes are given with temperature charts, etc.

Prophylaxis lies in vaccination of those exposed and intensive destruction of rats. Treatment is purely symptomatic.

[The reviewer is pleased to note that on pp. 25 and 38 of the *Malayan Medical Journal* of June 1935 several sentences from the critical review published in the *Bulletin* (1933, Vol. 30, p. 343) are quoted but regrets that no mention is made of this review in the otherwise ample bibliography at the end of the article.] D. H.

WOLFF (J. W.) & KOUWENAAR (W.). Onderzoekingen over Sumatra-ansche Rickettsiosen. [On Rickettsia Diseases in Sumatra.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1936. Feb. 4. Vol. 76. No. 5. pp. 272-288. With 5 graphs. [20 refs.] English summary.

An epidemiological survey of the occurrence of Sumatran mite fever (tsutsugamushi disease), scrub typhus, and shop typhus (endemic typhus) on the East Coast of Sumatra. From 1930 to 1934 the first two diseases occurred frequently among the labour population of different plantations in areas where uncultivated strips of land had to be cleaned. In these areas cases of mite fever and scrub typhus were

diagnosed amongst the same population groups showing a similar epidemiology the only difference being the occurrence or absence of a primary sore. The viruses of these two diseases have already been shown to be identical in their action on animals. On the other hand, in some areas in several instances many cases of scrub typhus were seen without accompanying cases of mite fever, an observation which may be accounted for by a difference in the vector.

Cases of shop typhus were fewer in number but occurred now and then in epidemic form on some plantations and in villages and towns. The virus of this disease is quite distinct from that of mite fever and scrub typhus and there is no epidemiological correlation. *D. H.*

UNION OF SOUTH AFRICA. ANNUAL REPORT OF THE DEPARTMENT OF PUBLIC HEALTH FOR YEAR ENDED 30TH JUNE, 1935 [THORNTON (E. N.), Secretary]. [**Typhus Fever** pp. 41-44.]

Previous to 1923 there was a series of epidemic years for typhus in the Union, over 10,000 cases being reported in one year; by 1927 the number of cases had fallen to 900 but gradually increased again until in 1935 there were 7,000 cases reported. This increased incidence is probably due to the immune population remaining after the epidemic years being replaced by a non-immune population of young adults. The problem here is almost entirely one of louse-borne typhus among a native population living in crowded, insanitary and poorly nourished conditions. The Health Department can at present deal only with outbreaks as they occur by isolation, quarantine and lousing. *D. H.*

PIETERMARITZBURG, CITY AND BOROUGH OF: ANNUAL REPORT OF THE MEDICAL OFFICER OF HEALTH FOR TWELVE MONTHS 1st JULY 1934 to 30th JUNE, 1935 [ANNING (C. C. P.)]. [**Typhus Fever** pp. 14-15.]

The Medical Officer of Health, Pietermaritzburg, states in his Annual Report that 9 cases of typhus fever among Borough residents were notified, part due to increased prevalence up-country, for there is a constant movement of natives from without in places where the disease is endemic into the town. Three were definitely imported cases as they were taken ill 2 days after arrival. The remaining six comprised 4 Europeans (3 males, 1 female), one Indian male and one native female. The last had been visiting an area where louse-borne typhus was occurring a week or two before. In the cases of the other 5 there was considerable evidence in favour of the infection being flea-borne. This, if a fact, will increase the difficulties of preventive work. [Nothing is said as to any of these cases ending fatally, but in the tabled return of deaths there is mention of two deaths of non-resident natives due to typhus fever.] *H. H. S.*

BOHLS (S. W.). **Typhus Fever in Texas.**—*Southern Med. J.* 1935. Dec. Vol. 28. No. 12. pp. 1162-1165. With 1 fig. [15 refs.]

An historical, epidemiological and serological discussion of the disease in the state of Texas. In 1922, 5 cases were reported, in 1934, 417.

D. H.

LEWIS (Seaborn J.). **Endemic Typhus Fever in South-east Texas.**—*Southern Med. J.* 1935. Dec. Vol. 28. No. 12. pp. 1150–1153. [16 refs.]

The first case of endemic typhus was recorded in New Orleans in 1929 and since then many more cases have been diagnosed, 40 in 1933. The Weil-Felix reaction which is a routine in the Hospital was positive for *Proteus X19* in all cases.

The author emphasizes the point that the skin manifestations in the cases that came under his observation have been, with few exceptions, insignificant and easily overlooked. In many no rash was ever detected by the physician in charge. As the author states, this point has not been sufficiently stressed in the literature and many cases of endemic typhus have been missed, as the physician has been taught to expect a profuse general typhus rash.

For prevention the author urges intensive rat campaigns; such campaigns in Texas have been followed by a marked drop in the number of the cases.

D. H.

PERGHER (J.) & CASIER (J.). **Le typhus exanthématique au Ruanda-Urundi. [Typhus Fever in the Belgian Congo.]**—*Ann. Soc. Belge de Méd. Trop.* 1935. Sept. 30. Vol. 15. No. 3. pp. 305–347. With 9 figs. & 1 map.

Towards the end of 1933 there was a sudden outbreak of a febrile disease in the district of Urundi, Belgian Congo, which was at first diagnosed as "infectious influenza." As the number of cases increased and many were fatal a fuller investigation was made and it was found that the disease was true epidemic louse-borne typhus. That the cases were true typhus was proved by the fact that the Weil-Felix reaction was positive in high titre with *Proteus X19*, also lice taken from patients and emulsified and injected into guineapigs produced a typical fever in these animals without any scrotal reaction. Clean lice fed on cases of fever were proved to be infective after a suitable incubation period. There were several thousand cases and the mortality rate at one period was 16·4 per cent.

As soon as it was realized that typhus fever existed isolation hospitals were established on suitable sites and all cases of fever were at once brought to these places; on arrival all clothing was removed and disinfected, the patients were bathed and shaved and clothed in hospital garments. Contacts also were segregated and dealt with in a similar manner; at the same time rigid quarantine was set up around the infected areas and the inhabitants were prevented from travelling out of such areas. Under this system the epidemic receded rapidly and within a short time no further cases were reported.

The authors are of opinion that the disease is not endemic in the Congo and that infection was introduced from without, possibly from Uganda.

D. H.

GIROUD (P.). **Enquête sur les rats des foyers typhiques du bled et d'une antique cité de l'intérieur de la Tunisie où le typhus sévit. [Examination of the Rats of Typhus Centres of the Country and an Ancient Town in the Interior of Tunis.]**—*Bull. Soc. Path. Exot.* 1935. Dec. 11. Vol. 28. No. 10. pp. 897–899.

Louse-borne typhus was prevalent in the town and country at the time of this investigation. Two-hundred-and-thirty-four rats were

captured and examined but it was not possible to isolate a typhus virus from any one of these, in marked contrast to the city of Tunis, where a murine typhus virus can be readily obtained from the rats near the docks and quays. The conclusion is that where louse-borne typhus is concerned man is the reservoir of the virus and not the rat. [See this *Bulletin*, 1935, Vol. 32, p. 558.] D. H.

NIGG (Clara). **On the Presence of Typhus Virus in Wild Rats in New York City.**—*Jl. Infect. Dis.* 1935. Nov.–Dec. Vol. 57. No. 3. pp. 252–254. [27 refs.]

Fifty-one wild rats were captured in the Metropolitan area of the city of New York, most of them from the neighbourhood of the wharves. The sera of 16 of these rats gave weak positive Weil-Felix reactions. The brains of these 16 rats were emulsified and injected into guineapigs, 2 for each rat brain. None of the 32 guineapigs showed any fever and no virus could be isolated, but 5 of the guineapigs when tested later showed some degree of immunity to a known typhus virus. D. H.

DA FONSECA (Flavio). *Notas de acarologia.* X. *Ocorrência, em S. Paulo, de acarídeos transmissores de várias modalidades de febre exantemática e suas possíveis relações com a Rickettsiose neotropical paulista.* [*Species of Ticks and Mites which may be Transmitters of the S. Paulo Typhus Virus.*]—*Mem. Inst. Butantan.* 1935. Vol. 9. pp. 27–41. [28 refs.] English summary.

The following have been found in the districts where S. Paulo typhus is endemic: *Amblyomma cajennense*, *A. ovale*, *A. striatum*, *R. sanguineus*, *B. microplus* and *H. leporis-palustris* among the Ixodidae; *Liponyssus bacoti* and other species and several of the Trombididae.

On both epidemiological and experimental grounds transmission by a tick was most probable, especially *A. cajennense*, since it is readily infectible and attacks rodents and human beings. The other two species of *Amblyomma* mentioned are common on dogs in the rural districts of S. Paulo, while *R. sanguineus* is under suspicion since it can transmit endemic typhus elsewhere as on the Mediterranean littoral—*fièvre boutonneuse*. *H. leporis-palustris* is commonly found on hares and can carry Rocky Mountain fever virus. Epidemiologically there is evidence that the mites may transmit infection but this needs further investigation. H. H. S.

LEWTHWAITE (R.) & SAVOOR (S. R.). **The Typhus Group of Diseases in Malaya.**—Part I: *The Study of the Virus of Rural Typhus in Laboratory Animals.* Part II: *The Study of the Virus of Tsutsugamushi Disease in Laboratory Animals.* Part III: *The Study of the Virus of the Urban Typhus in Laboratory Animals.*—*Brit. Jl. Experim. Path.* 1936. Feb. Vol. 17. No. 1. pp. 1–22. With 6 charts & 14 figs. (4 coloured) on 3 plates. [13 refs.]; pp. 23–34. With 2 charts & 7 figs. (3 coloured) on 2 plates. [10 refs.]

I. The authors refer to the difficulty experienced in establishing a strain of the virus of rural typhus (scrub typhus) in guineapigs. Previous workers have found that the intraperitoneal injection of blood taken from cases of the disease has occasionally produced fever in guineapigs but it has not been possible to passage the virus in series. The authors using guineapigs fed on a diet deficient in vitamins

succeeded in two instances in infecting guineapigs and after considerable difficulty in the first few passages established the virus and it is now in its 100th generation. Guineapigs can now be easily infected either by the intraperitoneal or subcutaneous route; special precautions as regards the diet of the animals is no longer necessary. The infection in the guineapig produces a fever of variable duration but in none of the infected male guineapigs was any scrotal reaction noted. Enlargement of the spleen and ascites were constant post-mortem features and in the fibrinous exudate on the spleen typical Rickettsia were readily demonstrated and are beautifully shown in the plates, which should be studied. When the virus was fully established in guineapigs a mortality of 90 per cent. occurred in the infected animals. [In Japan it has been found that the virus of tsutsugamushi fever produces only a mild illness in guineapigs, whereas the virus of Sumatran mite fever produces a severe and often fatal infection.] The lesions in the guineapig brain were meagre but typhus nodes could be found after careful search; also mononuclear perivascular collections were noted in the mesentery of the guineapig. Inoculation (intraperitoneal) of the virus into rabbits produced no symptoms of illness but a positive Weil-Felix reaction for *Proteus OXK* was detected. The route of choice for inoculation of rabbits is the intraocular according to the technique employed by Nagayo in Japan. Blood from 12 patients was inoculated into the eyes of rabbits and no less than 4 strains of virus were obtained by this means; infection was also readily obtained by the same route when emulsion of the brain of infected guineapigs was utilized. The local reaction in the rabbit's eye was similar to that described by Japanese workers with the virus of tsutsugamushi fever, that is an iridocyclitis. The rabbits did not have any fever and there were no general effects; after recovery from the local lesion immunity to the virus followed and persisted for at least one month. Rickettsia were demonstrated in the cells of Descemet's membrane and were similar to those seen in smears from the spleen of infected guineapigs and also to those described in the eye of rabbits infected with the virus of tsutsugamushi disease in Japan.

As regards the Weil-Felix reaction in infected rabbits the results were as follows: 29 rabbits infected by the intraperitoneal route, 18 positive for *Proteus OXK*, all negative for *Proteus OX19*; 26 rabbits (intraocular), 12 positive for *Proteus OXK* with a rising and falling titre, all negative for *Proteus OX19*.

Six rabbits were inoculated intradermally with emulsion of brain of infected guineapigs; a macular reaction occurred at the sites of injection in all and in four instances a definite small necrotic ulcer developed (tache noire).

Rats.—It has been found that wild rats as experimental animals in rural typhus research have been unsatisfactory for several reasons, but the authors have discovered that white rats can be readily infected with the virus which they have isolated and this virus can be indefinitely passaged in these animals (evidence that the virus is a murine variety and that the rat is a reservoir). The infected white rats had little or no fever and showed no scrotal reaction; infection had to be determined by employing guineapigs as "indicators"; also rabbits inoculated from infected white rats developed agglutinins for *Proteus OXK*; and Rickettsia could be demonstrated, but sparsely, in smears from the tunica vaginalis of these white rats. Incidentally no scrotal swelling was noted in any of the guineapigs infected from the white rats.

Monkeys.—Four monkeys injected intradermally with the rural typhus virus developed fever and a local reaction—a small ulcer with necrotic centre at the site of inoculation ; in 3 out of the 4 a bubo was also detected. All monkeys showed a leucopenia and the Weil-Felix reaction was positive for *Proteus OXK* in all 4, but the serum of one gibbon also agglutinated *Proteus OX19*. This gibbon strain of virus was subinoculated into rabbits and the sera of these animals soon lost the agglutinin for *Proteus OX19* and later only agglutinated *Proteus OXK*.

II. A strain of the local Malayan virus of tsutsugamushi fever obtained from a case of the disease was also studied. Tsutsugamushi fever in Malaya differs from rural typhus only in that a primary sore occurs in the former disease. This virus has not yet been established in guineapigs although these animals have been infected by the intra-peritoneal route and the post-mortem findings are identical with those in animals infected with the rural typhus virus described above. The tsutsugamushi virus can be readily inoculated into the eye of a rabbit and produces exactly the same effects as does the rural typhus virus, and identical Rickettsia can be demonstrated in the cells of Descemet's membrane ; the sera of these infected rabbits agglutinated *Proteus OXK* and not *Proteus OX19*.

Intradermal inoculation of this tsutsugamushi virus in monkeys and rabbits produces the typical primary sore and in monkeys a leucopenia was noted and agglutinins for *Proteus OXK* were produced.

III. Guineapigs can be easily infected with the virus of urban typhus and it can be readily passaged in these animals ; fever is invariably produced and 95 of the infected male guineapigs showed a very marked scrotal reaction which disappeared as the fever ceased. The mortality in the guineapigs with this virus was less than 1 per cent. The virus of urban typhus does not protect guineapigs against the virus of scrub typhus or tsutsugamushi fever nor *vice versa*. On post-mortem examination of infected guineapigs enlarged spleen was noted and marked changes in the tunica vaginalis (fully described in the text) ; but there was no ascites in contrast to the condition noted in guineapigs infected with rural typhus virus.

Rickettsia were readily found in smears from the tunica. The Rickettsia found in urban typhus resemble those found in rural typhus in that they infect the same type of cell, their intracellular distribution is the same and the staining by Giesma method is alike, but they differ from one another in length, width and numbers. In rural typhus the form is coccoid and diplococcoid and resembles *R. orientalis* in films ; in urban typhus the form is rod-like, they are fine delicate bacilli and resemble *R. prowazeki*. Intraocular injection of the virus of urban typhus produced a reaction in the eyes of rabbits but much less marked than that produced by the virus of rural typhus and it was not possible to passage the virus beyond the 3rd generation.

Fifty-eight rabbits were inoculated with the virus and of these 30 gave a positive Weil-Felix reaction for *Proteus OX19*, and a negative reaction for *Proteus OXK*.

Both rabbits and monkeys were injected intradermally with the virus but in none did a local sore develop at the site of injection, the serum of infected monkeys agglutinated *Proteus OX19* and there was no leucopenia in their blood, in marked contrast to the effects of injection of the viruses of rural typhus and tsutsugamushi fever.

D. H.

KLIGLER (I. J.), ASCHNER (M.) & LEVINE (Sonia). **Comparative Studies of the Louse-borne (Epidemic) and Flea-borne (Murine) Typhus Viruses.**—*Brit. J. Experim. Path.* 1936. Feb. Vol. 17. No. 1. pp. 53–60. [11 refs.]

The authors give an historical review of work done on the various typhus viruses and point out the striking differences in pathogenicity of the louse-borne and flea-borne viruses for guineapigs and rats. The flea-borne virus can be readily passaged in rats and mice and after 30 brain passages the properties of this virus remain constant notably the production of a scrotal reaction in guineapigs.

The louse-borne virus cannot be passaged in rats or mice and rarely if ever produces scrotal reaction in guineapigs. The authors studied the question first by infecting animals with the two viruses and later testing for immunity.

Fifty-seven animals were infected with the flea-borne rat virus and 17 were infected with the louse-borne or human virus; when tested later the animals were found to be immune both to the homologous and heterologous virus. But when formolized vaccines prepared from tissue cultures were employed for immunization a striking difference from the above results was noted; solid immunity was produced to the homologous virus but only partial immunity to the heterologous.

The authors consider that the two viruses differ both antigenically and biologically and they agree with NICOLLE that though probably having a common origin the two types are at present distinct. D. H.

LAIGRET (J.) & DURAND (R.). *Technique de la dessiccation et de l'enrobage du virus typhique murin.* [**Mode of drying and coating the Virus of Murine Typhus.**]—*Arch. Inst. Pasteur de Tunis.* 1936. Jan. Vol. 25. No. 1. pp. 82–88.

The brain of an infected rat or guineapig is made into a paste with phosphate of soda and dried over chloride of calcium *in vacuo*; the drying is completed in 3 hours and the dried brain is then pulverized. Various tests were made and it was found that the murine typhus virus stands desiccation well and the virulence is not altered in any way. The yolk of egg is added drop by drop to the pulverized brain, 4 cc. of yolk to 1 gram of powder, and then dried again; retained at a temperature of -10°C . this virus is active up to 15 days and *in vacuo* up to 12 days. The virus was also enveloped in oil only and was active up to 15 days. In actual practice the powdered virus in yolk of egg is taken to the place where the inoculations are to be carried out and the oil is added on the spot. D. H.

REGENDANZ (P.) & MUNIZ (Julio). *Pesquisas sobre a transmissão do typho exanthematico de S. Paulo por ixodideos.* [**Transmission of the Virus of S. Paulo Typhus by Ticks.**]—*Brasil-Medico.* 1936. Jan. 18. Vol. 50. No. 3. pp. 45–48.

Guineapigs were the animals used in this investigation to determine the transmissibility of S. Paulo virus by *Rhipicephalus sanguineus*. It is shown that nymphs developing from larvae which had fed on infected animals are themselves infective and can transmit the virus to other animals, and further that these ticks, infected in the larval stage, retain the infection as adults. In other words infection is retained and transmissible through all the stages of the tick's life, and it remains to be

proved whether the virus can pass to the ovum and so to a new generation. It is true that ticks are not often found on typhus patients, but, as the authors state, the larvae engorge themselves in 2-3 days and the nymphs in 1-2 days, their bite is so slight that it may pass unperceived and they drop off when engorged, and hence are not present by the time symptoms appear.

H. H. S.

MONTEIRO (J. Lemos). Tentativas de transmissão experimental do "typho exanthematico" de S. Paulo por percevejos (*Cimex lectularius*). [Attempts to transmit the S. Paulo Virus by Bed-Bugs.]—*Mem. Inst. Butantan*. 1935. Vol. 9. pp. 1-24. With 10 graphs. English summary.

Series of experiments were carried out (1) with adult *Cimex lectularius* collected in a house in Pinheiros; (2) with laboratory reared larvae; (3) with laboratory reared adults. As a result it was found that the virus is soon reduced and lost in the bed-bug. If the insect was fed on an infected guineapig during the febrile stage it was infective for a few, not more than 24, hours. Further tests carried out at intervals from 2-25 days were all negative, by bite or by faecal excretion.

H. H.

MUNIZ (Julio) & REGENDANZ (P.). Cultivo do virus do typho exanthematico em S. Paulo. [Cultivation of the Virus of S. Paulo Typhus.]—*Brasil-Medico*. 1936. Jan. 11. Vol. 50. No. 1. pp. 23-24. With 1 fig.

The technique employed was that of LI and RIVERS for cultivating vaccinia virus. This consisted in obtaining chicken embryos, 6-7 days old, washing in Ringer's solution and placing in a Petri dish with 2 cc. of Tyrode's solution of pH 7.7. After dividing the tissue as finely as possible, 0.1-0.2 cc. of the emulsion was placed in Erlenmeyer flasks each containing 5 cc. of Tyrode's solution, and the material for seeding was the triturated spleen (in Tyrode solution) of a guineapig killed on the second day of fever after infection with the virus. Cultivation was carried on for 5 days at 37°C., after which 1-2 cc. were injected intraperitoneally in guineapigs, test being made of the same culture for bacterial sterility. The animals presented the characteristic course of temperature, and died on the 8th or 9th day after inoculation. Rickettsia were found in scrapings from the peritoneum in about half the animals (a higher percentage than is found by direct inoculation of infected blood). Rickettsia were not found on examination of the cultures themselves—smears of the fluid medium or of the embryo tissue.

H. H. S.

DA CUNHA (A. M.). Cultura da "Rickettsia" do typho exanthematico de S. Paulo na membrana chorioallantoide de embrião de gallinha. [Cultivation of Rickettsia of S. Paulo Typhus in Chicken Embryonic Membrane.]—*Brasil-Medico*. 1936. Feb. 15. Vol. 50. No. 7. pp. 133-134. With 2 figs.

The authors inoculated the chorio-allantoic membrane of 7-10 day embryo chicks with a fragment of spleen from an infected guineapig. The eggs were then maintained at 40°C. and examination carried out 3-5 days later of the membrane in contact with the spleen fragment. In the case of 3 of four eggs so inoculated Rickettsia were seen by

section and staining on the third day and in the fourth examined on the 5th day they were more numerous. Further inoculation of guineapigs with fragments of the membrane triturated in saline set up the disease.

H. H. S.

REITANO (Ugo). Recherche du virus exanthématique murin à Rome. [Search for the Murine Typhus Virus in Rome.]—*Boll. Sezione Ital. Soc. Internaz. di Microbiologia*. Milan. 1935. Oct. Vol. 7. No. 10. pp. 377-383.

It is well known that boutonneuse fever occurs in Rome but so far no cases of endemic typhus have been reported in that city.

Two-hundred-and-twenty-five rats were captured during the years 1932 to 1935 at various seasons of the year and in different localities in the city including over 100 rats from the landing stages on the river.

The rats were killed and emulsions of the brains inoculated into guineapigs but no typhus virus could be isolated. As the author says although this does not exclude the occurrence of typhus virus in the rats of the city it at least means that it is rare.

D. H.

BRUYNOGHE (R.) & JADIN (J.). Culture du virus typhique murin sur la membrane chorio-allantoïdienne de l'embryon de poulet. [Culture of Murine Typhus Virus on Chick Embryo Membranes.]—*C. R. Soc. Biol.* 1936. Vol. 121. No. 2. pp. 153-155.

The authors repeated the work of ZIA and DA CUNHA and succeeded in cultivating their Antwerp typhus virus on chick embryo membrane using the method of Goodpasture.

The virus was also passaged from embryo to embryo for several generations and was proved to be virulent at each stage by inoculation into guineapigs.

D. H.

BLANC (Georges) & MARTIN (L. A.). Conservation du virus du typhus murin, à basse température. [Preservation of Typhus Virus at Low Temperatures.]—*C. R. Soc. Biol.* 1935. Vol. 119. No. 27. pp. 1322-1323.

The authors find that if the carcasses of infected guineapigs are maintained in the frigidaire at a temperature of -18° - -20° C. the virus of rat typhus of Casablanca can be isolated from the brain of these animals up to 45 days; but if rats are kept under the same conditions the virus is still viable up to 169 days.

D. H.

ZINSSER (Hans), CASTANEDA (M. R.) & HAGER (F. D.). Protective Action of Concentrated Anti-typhus Serum (Murine Type) against European Typhus Virus.—*Proc. Soc. Experim. Biol. & Med.* 1935. Oct. Vol. 33. No. 1. pp. 44-47. With 1 fig.

Previous trials had shown that antityphus horse serum (murine type) protected animals completely against the homologous virus but only slightly against a European typhus virus (human type).

This same serum was concentrated and it was found that the Weil-Felix reaction of the concentrate was much increased and the concentrated serum protected animals against the European virus as well as it did against the Mexican murine virus.

D. H.

GIROUD (Paul). Mise en évidence, dans le sang circulant, de virus typhique après la période d'évolution apparente de l'infection expérimentale. [Demonstration of the Virus of Typhus from the Blood of Experimental Animals Some Time after the Fever has ceased.]—*C. R. Soc. Biol.* 1935. Vol. 120. No. 40. pp. 1193-1194.

The author has found that the best method for obtaining the virus from cases of typhus is to take 10 cc. of blood from a vein, allow the blood to clot, remove the serum, then break up the clot and inject it intraperitoneally into guineapigs. Employing the same method in guineapigs the author was able to isolate the virus readily from animals that had had inapparent infections some 30 days before. *D. H.*

LÉPINE (P.) & SAUTTER (V.). Sur la durée de conservation du typhus murin dans l'encéphale du spermophile. [Duration of the Virus of Murine Typhus in the Brain of the Spermophile.]—*Bull. Soc. Path. Exot.* 1936. Jan. 8. Vol. 29. No. 1. pp. 13-16.

The authors have previously pointed out that the Macedonian spermophile (*Citillus citillus*) the ground squirrel, is susceptible to typhus virus.

Strains of murine virus have been passaged for one year through these animals without producing any change in the virus. Two animals were inoculated in each series; one of these was killed during the fever for passage of the virus and the others kept for varying periods to determine the longevity of the virus in the brain. Up to the 118th day after the fever the virus was isolated from all animals tested and up to the 226th day many, though not all, were still positive; one or two were still positive up to the 374th day. Even after this long duration in the brain the virus gave the same reactions when inoculated into guineapigs.

D. H.

NOURY (M.). Présence des virus typhiques dans la moelle épinière. Essais d'atténuation de ces virus par dessiccation. [Presence of Typhus Virus in the Spinal Cord of the Guinea pig. Attempts to attenuate it by drying.]—*Bull. Soc. Path. Exot.* 1935. Dec. 11. Vol. 28. No. 10. pp. 906-909.

Two strains of virus were used in these experiments, one a murine virus isolated in Casablanca the other a classical typhus virus from Tunis.

Guineapigs were inoculated and killed during the fever and the cord removed, washed and sectioned; small portions of the cord were emulsified and inoculated into other guineapigs and these developed typical fever with orchitis in the case of the Casablanca virus. No typhus lesions could be found in sections of the cord, nor could *Rickettsia* be demonstrated.

The virus can be passaged in guineapigs by this method just as readily as if brain emulsion was employed. Desiccation of the cords for 24 hours apparently destroyed the classical virus, but after 3 days drying the murine virus produced a mild attack of fever in one guinea pig, and when tested later this animal was immune. *D. H.*

DARDER (Emilio) & MENEU (Antonio). Dos casos de fiebre exantemática mediterránea. [Two Cases of Boutonneuse Fever.]—*Medicina Paises Cálidos*. Madrid. 1935. Dec. Vol. 8. No. 12. pp. 594–599. With 4 figs. [16 refs.]

The author places these two cases on record because, he states, only one case has previously been reported (in 1933) in the Balearic Islands. The present two were a man and his wife living in Mahón (Minorca), where the former was an official at the Naval Base. The former showed several "button" spots on the abdomen and the latter one marked with a necrotic centre. The course of illness in each case was the usual. The man was taken ill about a fortnight before his wife. He had a bitch with pups and they were overrun with ticks, which also invaded his office table and he often killed them with his hands. His wife washed the dogs to rid them of ticks and also killed many in the same way, and both may have thus become infected. *H. H. S.*

GIROUD (P.). Recherche des cas inapparents de typhus dans les foyers du bled et dans une petite ville de l'intérieur de la Tunisie en 1935. [Research for Cases of Inapparent Typhus in the Regions of the Country around Tunis and in a Small Town.]—*Bull. Soc. Path. Exot.* 1935. Dec. 11. Vol. 28. No. 10. pp. 899–905.

Out of 113 contacts with typhus fever 5 gave a rising positive Weil-Felix reaction but had no fever or other symptoms of typhus.

The blood of one of these cases was inoculated into guineapigs and they developed fever but when tested later were not immune to typhus virus. Of 27 contacts who gave a negative reaction the virus was isolated from 3; these were cases of inapparent infection. *D. H.*

CURRAN (E. J.). Some Observations on Fever of the Typhus Group (Vector Unknown).—*Jl. Roy. Army Med. Corps*. 1936. Feb. Vol. 66. No. 2. pp. 94–101. With 2 charts.

Ten cases of fever of the typhus group occurred in Jubbulpore in the year 1934 and are described in this paper.

All the cases showed marked constitutional disturbance and indeed resembled clinically the text-book descriptions of true typhus. One case in which symptoms of encephalitis developed ended fatally.

A profuse typhus rash which appeared on or about the 5th day of the fever and spread over the body including the palms and soles and face was noted in all the cases. The pyrexia lasted 15 to 16 days. All the cases gave a positive Weil-Felix reaction; some of the sera agglutinated *Proteus* X19 in highest dilution, some *Proteus* XK, and in 2 cases *Proteus* X2.

In none of the cases was there any history of tick or insect bite of any description and an exhaustive search for a possible vector proved futile. The cases were few in number, very scattered and bore little or no relation to one another; although a number of the patients belonged to one regiment these cases occurred in different companies and in different bungalows and at different periods of the year.

[It is obvious that these cases cannot be classified according to the vector neither can they be classified by the Weil-Felix reaction as, although clinically similar, some agglutinated X2, some XK, and some X19 in highest dilution.] *D. H.*

CULLEN (Thos.). **Report on a Case of Fever belonging to the Typhus Group.**—*West African Med. Jl.* 1935. Nov. Vol. 8. No. 4. pp. 15-16.

A case of fever which was clinically typical of the typhus group of fevers. The fever lasted 14 days and a morbilliform rash covered the limbs and body and also was noted on the palms and soles and on the face. The following points were noted: (1) rash, (2) the odour, (3) intense headache, (4) duration and character of the fever, (5) negative Widal reaction. It was not possible at the time to carry out the Weil-Felix reaction. D. H.

KUYPERS (C. A.). Een tweetal gevallen van Tropical Typhus? [**Two Cases of Tropical Typhus?**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1935. Oct. 29. Vol. 75. No. 22. pp. 1896-1903. With 2 figs. [18 refs.]

These two cases, although the diagnosis continued somewhat doubtful to the end, deserve a record, if only to show how difficult a decision may be. Both showed scrotal lesions, which are regarded as "primary." Case No. 1 was one of sudden commencement, acute illness, high fever with rigors, a somewhat swollen penis and painful enlarged inguinal glands. At first there was no abnormality of scrotum or testicle. Soon there appeared necrotic areas on the prepuce and erosions on the scrotum. These necrotic areas spread over penis and scrotum. Serum tests on the 7th day proved puzzling: typhoid and paratyphoid B negative; *Proteus X19 O* positive with coarse flocculation 1-100, weakly positive 1-600 with fine flocculation; *Proteus XKi.O* lysis 1-600 with clarification, partial lysis and coarse flocculation 1-1,000. By the 12th day all serum tests were completely negative.

After considering all the possibilities the conclusion come to is that this was a patient infected with tropical typhus on the scrotum or penis and that the necroses were due to primary local vascular changes.

In the second case, which was fatal, there was marked jaundice and again a scrotal lesion in the shape of an ulcer on the raphe at the base of the penis. Serum tests gave: typhoid positive 1-2,000, paratyphoids and tropical typhus negative. In spite of these findings and in spite of jaundice, the author considers, on clinical grounds that the case was one of tropical typhus and that the scrotal ulcer was the primary lesion.

W. F. Harvey.

LÉPINE (P.). Sur l'existence, en Indochine, de trois espèces au moins de fièvres exanthématiques. [**Three Varieties of the Typhus Group of Fevers occurring in Indochina.**]—*Bull. Soc. Path. Exot.* 1936. Jan. 8. Vol. 29. No. 1. pp. 16-19. [11 refs.]

The author considers that it has been proved that there are at least 3 types of typhus fever in Indochina:—

1. Historic typhus carried by lice.
2. Endemic typhus carried by the rat flea.
3. Japanese River Fever carried by a mite.

Further research is necessary to determine the relationship between Japanese River fever and similar fevers met with in Malaya, Sumatra and French Indochina. D. H.

MEYER (K. F.). **Latent Infections.**—*Jl. Bacteriology.* 1936. Feb. Vol. 31. No. 2. pp. 109–135.

Among other conditions inapparent infections in typhus are discussed ; the author prefers the term latent infection. D. H.

MASSIAS (Charles). Typhus tropical bénin, typhus endémique à Tra-vinh (Cochinchine).—*Bull. Soc. Méd.-Chirurg. Indochine.* 1935. Oct. Vol. 13 No. 8. pp. 1040–1045. [19 refs.]

RAGIOT (Ch.), DELBOVE (P.), NGUYEN-VAN-HUONG & HO-THIEN-NGAN. Fièvre typho-exanthématique avec fièvre typhoïde associée. [**Typhus associated with Typhoid Fever.**].—*Bull. Soc. Méd.-Chirurg. Indochine.* 1935. July-Aug. Vol. 13. No. 6. pp. 762–766.

A case of fever with typhus-like rash, swollen face, injected conjunctiva and delirium ; the patient died on the 9th day. The *Bact. typhosum* was isolated from the blood, the Widal reaction was positive and the Weil-Felix reaction was negative. Blood taken from the patient during the fever and injected into guineapigs produced fever in these animals and orchitis. When tested later with a true typhus virus these animals were found to be immune. D. H.

LEWTHWAITE (R.). **The Pathology of the Tropical Typhus (Rural Type) of the Federated Malay States.**—*Jl. Path. & Bact.* 1936. Jan. Vol. 42. No. 1. pp. 23–30. With 8 figs. (4 coloured) on 3 plates.

This paper deals with the morbid anatomy of rural typhus in man and the histopathology of the brain in that disease. The description of the gross pathology is based on the findings of 12 autopsies made by the author at the District Hospital in Kuala Lumpur. It may be said that naked eye examination gave no single consistent feature that could be regarded as peculiar to tropical typhus ; the few pathological changes noted may all be met with in the morbid anatomy of other tropical diseases.

Morbid histology of the brain.—This examination was made in 7 cases, in 2 no lesions could be detected after prolonged search.

In rural typhus the microscopic findings in the brain are meagre but all the lesions described by previous workers in the brains of human cases of louse-borne typhus could be found in one or other of the brains examined. The lesions in the brain in cases of rural typhus differ only in degree and number from those found in epidemic typhus. The principal lesion consists of a slight perivascular proliferation of neuroglia cells one or two cells in depth along the course of capillaries or arterioles ; these vessels also show a slight degree of swelling of the endothelial cells. In a few instances this lesion was well marked and merited the term "typhus node." These lesions are beautifully demonstrated in figures which also show *Rickettsia* in the cytoplasm of the swollen endothelial cells. D. H.

SPARROW (Hélène) & ROUSSEL (Henri). Fréquence remarquable du *Proteus X19* au cours d'une épidémie de typhus. [Frequent Isolation of *Proteus X19* in an Outbreak of Typhus Fever.]—*Arch. Inst. Pasteur de Tunis*. 1936. Jan. Vol. 25. No. 1. pp. 58-73. [10 refs.]

Reference is made to previous work on the subject of the isolation of strains of *Proteus X19* from cases of typhus. In some epidemics although cultures were attempted from many cases it has not been possible to isolate *Proteus* strains from any of the patients; in other epidemics cultures of *Proteus X19* have occasionally been obtained.

In the present research bloods sent to the laboratory for agglutination and Wassermann reactions were used for cultural purposes. The serum was first drawn off and the clot broken up and placed in broth tubes and incubated. Four hundred and one samples of blood were tested as follows :—

	Results <i>X19</i>	Per cent
65 cases of typhus	32	50
48 suspected cases of typhus	1	
129 other fevers	11	8.5
124 contacts healthy	0	
35 syphilitics	0	
<hr/> 401	<hr/> 44	<hr/> 11.0

In the 65 cases of fever definitely diagnosed as typhus 44 gave a positive Weil-Felix reaction, and a strain of *Proteus X19* was isolated from 13 of these, and from 21 cases in which the Weil-Felix reaction was not positive (early cases mostly) *Proteus X19* strains were isolated from 19 or practically in every case. Although the bacillus could be most readily isolated from the cases before agglutinins had developed yet in one instance a strain of *Proteus X19* was isolated from the blood of a patient giving a very high titre of agglutination and also from 4 cases of convalescents after fever had ceased.

All the cultures resembled one another biologically: lactose no change, glucose, maltose, and saccharose acid+gas, indole produced and gelatine liquefied; all the strains were agglutinated by specific rabbit serum for *Proteus X19*, and also by the serum of cases of typhus, both in the O and H forms. D. H.

KANAREWSKAJA (A. A.) & BOGOMOLOV (I. I.). Die Agglutinine gegenueber *Proteus X19* im Liquor bei Fleckfieber. [Agglutinins for *Proteus X19* in the Spinal Fluid of Typhus Patients.]—*Arch. Sci. Biol.* 1935. Vol. 38. No. 2. [In Russian pp. 539-542. German summary p. 543.]

The cerebrospinal fluid was tested for agglutination of *Proteus X19* in 44 patients suffering from typhus fever. In 28 of them there was a positive result in low dilution "50-70 times less than in blood serum." In convalescence the agglutinins usually disappeared, in two only was there a residual agglutination and that in very small degree. It is believed that the agglutinins are not produced locally but have resulted from passage from the blood to the spinal fluid. H. H. S.

- i. DELVILLE (J. P.). Recherche des bacilles du groupe *Proteus X* chez les animaux inoculés avec les différents virus des typhus. [**Bacilli of the Proteus Group in Animals Inoculated with Typhus Viruses.**]—*Arch. Inst. Pasteur de Tunis*. 1936. Jan. Vol. 25. No. 1. pp. 147–148.
- ii. ——. Recherche des bacilles du groupe *Proteus X* chez les rats du port et de la ville de Tunis. [**Search for Bacilli of the Proteus Group in the Rats of the Port and Town of Tunis.**]—*Ibid.* pp. 142–146.

i. Cultures were made from the blood, brain and spleen of experimental animals (rats, mice, rabbits, guineapigs, cats and monkeys) infected with typhus virus; 125 animals in all were investigated but from none of the cultures could any bacillus of the *Proteus* group be isolated.

ii. Two hundred wild rats captured in the port of Tunis were examined in the same way. Three strains of *Proteus* were isolated but these strains were not agglutinated by specific *Proteus X19* sera or by the sera of typhus cases. However after subculture the strains were eventually agglutinated by *Proteus X19* rabbit serum but still not by sera of cases. The author considers that these strains were in a state of transformation from *Proteus vulgaris* to *Proteus X19*. D. H.

DELVILLE (J. P.). Etude comparative de la production des agglutinines anti *OX19* chez le lapin neuf et chez le lapin typhique. [**Agglutinins of Proteus OX19 in Rabbits inoculated with Proteus and with Typhus Virus.**]—*Arch. Inst. Pasteur de Tunis*. 1936. Jan. Vol. 25. No. 1. pp. 149–153. With 4 figs.

If rabbits are inoculated with typhus virus, agglutinins for *Proteus OX19* appear about the 20th day, whereas if rabbits are inoculated with the bacillus the agglutinins appear about the 5th day after the inoculation. In rabbits which have previously been infected with typhus virus and are subsequently inoculated with killed cultures of *Proteus X19* the agglutinins for this bacillus appear earlier than they do after injection of normal rabbits. D. H.

GAUD & NAIN. Note sur le parasitisme du chien à Rabat par le *Rhipicephalus sanguineus*. [**Note on Prevalence of Ticks on Dogs in Rabat.**]—*Bull. Soc. Path. Exot.* 1935. Oct. 9. Vol. 28. No. 8. pp. 718–719.

An investigation of the number of *R. sanguineus* on dogs in Rabat was made.

These ticks are very numerous on the dogs during the months April to November and practically disappear during December, January and February.

Cases of boutonneuse fever are most common from May to August when the number of ticks on the dogs is at its peak. D. H.

VAN LOGHEM (J. J.). Een proteus-X-Kingsbury-stam in statu nascendi. [**A Kingsbury Strain of Proteus in Process of Development.**]—*Nederl. Tijdschr. v. Geneesk.* 1936. Feb. 29. Vol. 80. No. 9. pp. 817–824. With 5 figs. English summary.

More than ten years ago the author isolated a strain of *Proteus* from the faeces of a child in Amsterdam. The strain was indologenic and

designated *FK*₁₂. Sera from patients with scrub-typhus agglutinate it to a certain degree and this peculiarity is explained by a splitting of the strain in colonial growth, whereby some colonies were composed of non-indologenic organisms which were agglutinated by scrub-typhus sera to the same titre as a genuine Kingsbury strain. The author also showed that the *X* element of *Proteus XK* is not only agglutinated by scrub-typhus serum but is itself an antigenic component. A *Proteus XK*-rabbit serum agglutinated *X* subcultures of the strain *FK*₁₂ but not other subcultures. He hypothecates *X* elements in the mosaic of the O-antigen of all ordinary *Proteus* strains. "*X*-strains are ordinary *Proteus* strains in which *X*-elements are dominating by adaptation or regression." The *X*₁₉ element is always connected with production of indol.

H. H. S.

SCALES (C.). **Some Observations on the Weil-Felix Reaction.**—*Jl. Roy. Army Med. Corps.* 1935. Nov. Vol. 65. No. 5. pp. 317-319.

In this investigation concentrated O emulsions of *Proteus X*₂, *X*₁₉ and *XK* were employed and the technique followed was exactly the same in each case. During the year 1934 17 cases of fever of the typhus group gave positive Weil-Felix reactions, 2 for *Proteus X*₂, 9 for *X*₁₉ and 6 for *XK*. The range of titre of agglutination in these cases varied from 1/500 up to 1/100,000 and the maximum titre was usually obtained from the 9th to the 14th day of the disease. When the sera of some of these people was retested 3 to 6 months later none of them gave a positive reaction. The sera of 150 normal people, Indians and British, gave negative results. In 8 cases of enteric fever (blood culture positive) the Weil-Felix reaction was negative; but in 8 cases of typhus fever there was a definite increase of the inoculation agglutinins for *Bact. paratyphosum B*.

D. H.

SAVOOR (Sadashivarao R.), CASTANEDA (M. Ruiz) & ZINSSER (Hans.). **Notes on the Weil-Felix Reaction in Individuals not suffering from Typhus.**—*Proc. Soc. Experim. Biol. & Med.* 1935. Dec. Vol. 33. No. 3. pp. 365-366.

The sera of 600 individuals was tested; only 4 gave a positive reaction in a dilution of 1/160 and 25 in 1/80.

The sera of persons (25) born in Russia gave on the whole lower reactions than the sera of persons born in America.

D. H.

LÉPINE (P.). La réaction de Weil-Felix chez les chiens d'Athènes. [**The Weil-Felix Reaction in Dogs in Athens.**]—*C. R. Soc. Biol.* 1936. Vol. 121. No. 7. p. 634.

During the months February to November in 1934 the sera of 270 dogs was examined for the Weil-Felix reaction. Forty-six or 17 per cent. gave a positive reaction for *Proteus OX*₁₉.

The author considers that these positive reactions are due not to the virus of typhus but to that of boutonneuse fever; the dogs were infested with ticks and these ticks were found to carry the virus of boutonneuse fever. Cases of this disease were occurring in Athens at the time.

D. H.

BLANC (Georges), NOURY (M.) & BALTAZARD (M.). Préséance et prémunition au cours du typhus exanthématique et au cours de l'infection inapparente par virus bilié. [**Premunition in the Course of Typhus Fever and in the Course of Inapparent Infection after Bile Treated Vaccine.**—*C. R. Acad. Sci.* 1935. Dec. 9. Vol. 201. No. 24. pp. 1226-1227.

"Préséance" is defined as a condition, due to the presence of a living germ in the body, which prevents infection by further doses of germs of the same species.

It has been noted by the authors that when people have been inoculated with the living bile-treated typhus virus in the presence of an epidemic of typhus that epidemic has forthwith ceased.

The authors explain this occurrence in the light of the condition of "préséance" in these inoculated people; such a condition is only possible after inoculation with living virus.

In the present paper they bring forward experimental evidence in favour of this theory. Fifteen persons were inoculated with minimal doses of bile treated virus; 10 of these were reinoculated 7 days later with pure virus, only 4 out of the 10 had fever; 40 days after the initial inoculation all the 15 inoculated people were given doses of pure virus and only one, a European who had not received the second inoculation, reacted.

D. H.

NICOLLE (Charles) & LAIGRET (J.). Vaccination contre le typhus exanthématique à l'aide du virus typhique vivant, desséché et enrobé. [**Vaccination against Typhus by means of Laigret's Dried and Coated Virus.**—*Arch. Inst. Pasteur de Tunis.* 1936. Jan. Vol. 25. No. 1. pp. 40-54. With 6 charts.

The method of preparation of the vaccine was as described in the paper by LAIGRET above (p. 427), double envelopment of dried virus (Tunis murine No. 1) in yolk of egg and oil. This envelopment does not neutralize the virus in any way but localizes it. Of 9 people inoculated with a vaccine in which the virus was enveloped in yolk of egg and water 5 developed mild attacks of fever. One hundred and fifty-three people were inoculated with a dried virus in oil—only one of these contracted fever. One hundred and ten people inoculated with the virus in yolk of egg and oil—none contracted fever. It was noted during the investigation that rat brain used as source of virus is more likely to cause fever than guineapig brain; the following method of dosage has therefore been adopted:—

1st dose 1/200 of guineapig brain.

2nd dose (25 days later) 1/200 rat brain.

3rd dose (test dose) ... 1/50 to 1/12 rat brain.

No reaction to test dose in any case.

D. H.

SPARROW (Hélène). Essais d'immunisation avec le virus murin I de Tunis, introduit par la voie nasale. [**Attempts at Immunization with the Tunis Rat Typhus Virus by the Nasal Route.**—*C. R. Acad. Sci.* 1935. Dec. 23. Vol. 201. No. 26. pp. 1441-1443.

A few drops of emulsion of the brain of infected rats (Tunis murine Virus No. 1) were instilled into the nostrils of rats and guineapigs; only one rat developed fever but all the animals when tested later were found to be immune to a true typhus virus.

A few drops of the same murine virus No. 1 were instilled into the nostrils of a young man ; 10 days later he developed fever and passed through a typical attack of mild typhus. *D. H.*

SPARROW (Hélène). Essais de vaccination avec les rickettsias du virus murin I de Tunis. [**Attempts at Vaccination with Rickettsia of Tunis Rat Typhus Virus.**—*C. R. Acad. Sci.* 1935. Dec. 30. Vol. 201. No. 27. pp. 1524-1525.

NICOLLE (Charles). Réflexions au sujet de la note précédente de Mme. Sparrow.—*Ibid.* p. 1526.

The author has noted that if lice are fed on patients suffering from endemic typhus in Tunis they do not become infected, but she has succeeded in infecting lice by the rectal injection of Tunis murine virus No. 1.

The infected lice die on or about the 4th day with large numbers of *Rickettsia* in the intestine.

The contents of 5 to 10 infected lice intestines were injected intraperitoneally into guineapigs and rats ; none of the animals developed fever but when tested later 4 out of 6 guineapigs were immune to a true typhus virus and 4 out of 5 rats were immune to the rat virus No. 1. The method of instilling the louse virus into the nostrils and conjunctiva of rats and guineapigs was also employed—none developed fever but immunity was produced. The same virus dropped in the conjunctiva of a young man produced no reaction whatever.

Professor Nicolle in a footnote emphasizes the point that passage of Tunis rat virus No. 1 through lice attenuates the virulence of the virus for experimental animals and for man. *D. H.*

GIROUD (Paul) & PLOTZ (Harry). Essai sur les variations du pouvoir infectant et vaccinant des cultures des virus typhiques en fonction des voies d'introduction. [**Variations in the infecting and vaccinating Power of Cultures of Typhus Virus according to the Route of Infection.**—*C. R. Soc. Biol.* 1936. Vol. 121. No. 4. pp. 312-313.

Cultures of typhus virus obtained by the method of Nigg and Landsteiner were employed in this research.

The cultures were introduced into experimental animals by various routes, intracerebral, conjunctival, nasal, by the digestive route, on the scarified skin and intradermally. Of these routes the intradermal, subconjunctival, and nasal gave the greatest number of infections and produced the best vaccinating effects. *D. H.*

LE CHUITON (F.), MONDON (H.), BERGE (Ch.), PENNANÉAC'H (J.) & DUBREUIL (J.). Importance de la voie testiculaire pour la mise en évidence chez le cobaye du typhus endémique observé chez l'homme. [**Importance of the Testicular Route in Infecting Guineapigs with the Virus of Endemic Typhus from Man.**—*Bull. Acad. Méd.* 1935. Dec. 3. 99th Year. 3rd Ser. Vol. 114. No. 39. pp. 530-532.

It has always been difficult to isolate the virus of endemic typhus from cases of the disease, especially so in the case of the Toulon ship virus.

The authors now find that if blood taken at the height of the fever is injected directly into the guineapig testicle instead of intraperitoneally the virus can be recovered in a large percentage of cases. *D. H.*

DUBOIS (A.) & NOËL (G.). Essais d'immunité avec la souche de typhus exanthématique de l'Urundi. [**Immunity Experiments with Typhus Virus from Urundi, Congo.**]*—Ann. Soc. Belge de Méd. Trop.* 1935. Sept. 30. Vol. 15. No. 3. pp. 349-359.

The author brought 2 strains of typhus in guineapigs from Urundi, Congo, to Belgium. One strain was obtained directly from the blood of a case of fever the other from lice fed on a case of fever.

When inoculated into rats these 2 viruses did not produce fever but when tested later these animals were found to be immune to typhus virus; also when Congo virus was injected into rabbits the serum of these animals gave later a positive Weil-Felix reaction. This virus produced fever but no orchitis in the guineapigs. Guineapigs which had recovered from fever caused by the Congo virus proved to be protected from inoculation with a European rat typhus virus and *vice versa*. The conclusion is that the Congo virus is a true typhus virus of the human type. *D. H.*

ZIA (Samuel H.) & WU (Chao-Jen). **Protection against Experimental Typhus Infections (Peiping Strain) with Immune Mexican Typhus Serum.***—Proc. Soc. Experim. Biol. & Med.* 1935. June. Vol. 32. No. 9. pp. 1406-1408. With 2 charts.

The authors obtained some of Zinsser's antityphus horse serum from America and tested its protective power against a local strain of human typhus virus.

Guineapigs were injected with 1/15 of a suspension of the brain of an infected guineapig and 24, 72 and 120 hours later 1 cc. of immune serum was injected; normal serum was injected into control animals. None of the animals receiving the immune serum developed fever; all controls reacted. *D. H.*

LE CHUITON, BERGE (C.) & PENNANÉAC'H (J.). Transmission expérimentale au chat du typhus murin (souche toulonnaise). Premières considérations sur cette transmission. Présence du virus dans l'urine. [**Experimental Infection of the Cat with Rat Typhus Virus.**]*—Bull. Soc. Path. Exot.* 1935. Oct. 9. Vol. 28. No. 8. pp. 685-688.

The virus used in this investigation was a rat typhus virus isolated from rats in the ships of war in Toulon Harbour.

Young cats were injected with emulsion of brain of infected guineapigs; these cats had a few days' fever without orchitis and the brain and urine of the cats was shown to be infective. Cats were also infected by being fed on the brains of guineapigs. The virus, after passage through cats, showed some loss of virulence for the guineapig. *D. H.*

PARKER (R. R.). Rocky Mountain Spotted Fever. Epidemiology with Particular Reference to Distribution and Prevalence in the Western United States.—Reprinted from *Northwest Med.* Seattle. 1935. Apr. Vol. 34. No. 4. pp. 111–121. With 9 maps & 6 charts. [11 refs.]

" Since Rocky Mountain spotted fever was first [1890] recognized as a specific infection in the northern Rocky Mountain region of the United States, there has been a vast extension of the geographical limits within which endemic foci are known to be present. The territory now included involves a very large part of the United States and extends northward into at least southern Canada. In the western United States the pushing out of the known limits of endemicity has been more or less gradual over the past thirty years, but definite knowledge of occurrence in the . . . Mississippi valley and eastern states . . . has essentially all been secured within the past three years."

The above is the thesis of this able study of the epidemiology of Rocky Mountain fever.

Figures are given of the number of cases of the disease reported and these cases are shown graphically on a map of the western States, the interesting point being that all these areas of prevalence lie within the range of the Rocky Mountain wood tick *Dermacentor andersoni*.

It is noted that there is a definite cyclic prevalence of the disease in the western States; there may be many cases in one year and few or none for a year or two followed again by a year with many cases. In one area a few cases each year were noted for 4 years followed by a period of ten years without any cases when the disease again appeared. The explanation of this cyclic prevalence lies probably not so much in the relative abundance or scarcity of ticks but in the number of ticks which are actually carrying the virus.

As regards the spread of the disease to other areas the question is discussed whether this is a true outward expansion of the endemic areas or whether the disease has occurred there previously and escaped detection. The following possibilities are suggested to account for the regional distribution as at present known: (1) That long ago foci of Rocky Mountain spotted fever were scattered throughout a much larger part of the Rocky Mountain region than was then suspected or has since been generally supposed; (2) that from such foci there has been an intensive dispersal of the virus to adjacent territory but only within the *D. andersoni* range; (3) that this dispersal has been accomplished by the intensive spread of *D. andersoni*. But there is no evidence that *D. andersoni* has become established in the eastern or central States; in these States *D. variabilis* and *occidentalis* and possibly *R. sanguineus* are concerned. As regards the occurrence of Rocky Mountain fever in the eastern States the question again arises, is this a new disease in these areas or has the disease been present there for many years and unrecognized? If the disease has recently been imported into these new areas out of the range of *D. andersoni*, is it by means of importation of infected *andersoni* ticks? The author considers that there is no evidence of spread by this means but suggests that the rabbit tick, *H. leporis palustris*, may be responsible for the spread of the virus, although not directly responsible for human cases of the disease as it does not bite man; this tick is not confined to the Rocky Mountains but is found on most species of rabbits wherever these small rodents are found in the United States. Thus the virus of

spotted fever may have existed, as it is known to exist at present in nature in a low grade phase that does not produce frank recognizable infections in man and such strains of virus may sooner or later assume an increasing virulence and become capable of causing clinically recognizable symptoms. This virus is spread and kept alive in the rodent population by the rabbit tick and occasionally conveyed to man by ticks such as *D. andersoni* and *variabilis* which bite both rodent and man. D. H.

- i. BENGSTON (Ida A.) & DYER (R. E.). **Cultivation of the Virus of Rocky Mountain Spotted Fever in the Developing Chick Embryo.**—*Public Health Rep.* 1935. Oct. 25. Vol. 50. No. 43. pp. 1489–1498. With 3 plates. [19 refs.]
- ii. LILLIE (R. D.). **Histologic Reaction to the Virus of Rocky Mountain Spotted Fever in Chick Embryos.**—*Ibid.* pp. 1498–1501.

- i. The method of Goodpasture was employed and the virus selected for experiment was the Bitterroot strain of Rocky Mountain spotted fever.

A small window was cut in the egg shell and the membrane was infected by means of a syringe, the inoculum in the first case being a few drops of emulsion of infected guineapig brain and, later, emulsion of infected chick embryo membrane in series. (Twenty such passages were made.) The "window" was vaselined around the edge and covered with a sterile cover slip and was observed through a dissecting microscope. It was noted that many of the embryo chicks died on the 5th to the 6th day after the inoculation; that these fatalities were due to the virus was probable because control embryos inoculated with endemic typhus virus did not succumb. It was found by experiment that the virus was not confined to the membranes but its presence could also be demonstrated in the organs of the chick, especially the liver and brain. Infected membrane viewed through the cover glass window showed small discrete cloudy areas which subsequently coalesced.

Rickettsia were found in the cytoplasm of the epithelial cells in all generations after the tenth. Emulsions of the infected membranes from 54 infected eggs were injected into guineapigs; 104 were inoculated and all developed fever and showed symptoms identical with that produced by the virus from the tick.

Seventy-two out of 80 guineapigs died; 6 of those which recovered were tested with the Bitterroot virus and proved to be immune.

- ii. Sections were cut out of the entire chick embryo, these were stained by Romanowsky, Weigert and van Gieson stains and studied.

Lesions began to appear on the 9th or 10th passage generation about the same period that Rickettsia began to appear.

The significant features of these lesions appear to be vascular adventitial proliferation, lymphocytic infiltration and occasional endovascular lesions. D. H.

OGATA (Norio). Die Tsutsugamushi-Krankheit. "Rickettsia tsutsugamushi." [Tsutsugamushi Fever. Rickettsia tsutsugamushi.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Dec. Vol. 39. No. 12. pp. 491–505. With 8 figs.

A review of work done by the author and other Japanese research workers on tsutsugamushi fever read before the Institute of Tropical Diseases in Hamburg in November 1935.

In his summary of the review the author states that the problem of the aetiology of the fever which had engaged the attention of research workers in Japan for 50 years was finally solved by his discovery in the year 1927 of the cause of the disease, *Rickettsia tsutsugamushi*, by the injection of the blood of cases of the fever into the testicle of rabbits and passage of the virus by this means for many generations, the *Rickettsia* being readily demonstrated in the testicular tissues by various staining methods.

The author has also shown that the mouse is a very suitable animal for experimental work and tissue culture of the virus has been usefully employed. D. H.

YOSHIDA (Shizuo). **On the Tissue Culture of Tsutsugamushi Virus (*Rickettsia tsutsugamushi*).**—*Kitasato Arch. Experim. Med.* 1935. Oct. Vol. 12. No. 4. pp. 324–337. With 6 figs. on 1 plate.

The inoculum employed in these experiments was the infected parenchyma of rabbit's testicle.

The medium consisted of 1 drop of infected extract of testicle in Ringer's fluid and 2 drops of heparinized rabbit plasma. The slide cover slip method was employed and the specimens were incubated at a temperature of 28° to 32°C. Every 3 or 4 days specimens were stained and examined and animals were inoculated from the culture. *Rickettsia* appear on or about the 8th day and after 2 weeks cultivation are found in 100 per cent. of the cultures.

The virus could be kept alive in culture up to 36 days without transplantation, but can be kept much longer by addition of fresh plasma and fresh tissue cells.

The author refers to his method of "total staining"; this consists in taking the cover slip on which the culture rests, allow the cells to settle on the glass and remove all the fluid media, fix the cells then wash thoroughly and stain. This gives much better results than smear preparations of the cells. D. H.

KOUWENAAR (W.) & WOLFF (J. W.). **Sumatranisches Milbenfieber: Eine Krankheit der Fleckfiebergruppe.** [**Sumatran Mite Fever.**]—*Zent. f. Bakt. I. Abt. Orig.* 1936. Jan. 13. Vol. 135. No. 7/8. pp. 427–436. With 4 figs. [16 refs.]

This paper is a résumé of work done in the Dutch East Indies by the authors on the 3 types of the typhus group of fevers which occur there, and already noted in the *Bulletin*.

- | | | |
|------------------------|------------|-----------------|
| 1. Sumatran mite fever | <i>XK</i> | + primary sore |
| 2. Scrub typhus | <i>XK</i> | no primary sore |
| 3. Endemic typhus | <i>X19</i> | " " |

Experimental work on the viruses of these diseases and the virus of Japanese river fever employing rats, rabbits, guineapigs, mice and monkeys is very fully reported. The conclusions arrived at are that Sumatran mite fever and Japanese river fever are not identical although clinically they resemble one another very closely; the virus of Sumatran mite fever produces a severe and often fatal disease in guineapigs and a mild infection in monkeys whereas the reverse is the case with the virus of Japanese river fever, also monkeys which have recovered from Japanese river fever are susceptible to the virus of Sumatran mite fever.

The authors also consider that scrub typhus is Sumatran mite fever without the primary sore [see also O'CONNOR, above].

The primary sore in Japanese river fever and in Sumatran mite fever is due to the injection of the virus by the mite directly into the skin; if scrub typhus is carried by a tick this vector would inject the virus not directly into the skin but subcutaneously and this might explain the absence of the primary reaction in these cases.

[This suggestion of the authors is not applicable in the case of boutonneuse fever and African tick bite fever both of which are carried by ticks and in both primary sores are almost invariably present.]

D. H.

BESSEM (N.). Een geval van Mijtekoorts in de Westerafdeeling van Borneo. [**A Case of Mite Fever in the Western Division of Borneo.**] —*Geneesk. Tijdschr. v. Nederl.-Indië*. 1935. Oct. 29. Vol. 75. No. 22. pp. 1909–1910.

This case appears clearly to have been one of mite fever. The disease occurred in a full European, 55 years of age. On admission to hospital with a temperature of 39·4°C. ten days after its commencement he complained of severe headache and pain in the loins; his face was suffused, the conjunctivae injected, the mouth and lips dry and he looked ill. There was a painful lymph node in the groin corresponding to a skin lesion the size of a pin head on the scrotum. Around the lesion, the "primary lesion," there was bleeding and hyperaemia. The patient became ill, had severe cough without sputum and a continuous temperature ranging between 38°C. and 40·5°C. Urine and faeces showed nothing abnormal. He died 12 days after admission. The diagnosis was checked by the serological findings: negative agglutination for *Proteus X19* and positive 1–1,500 for *Proteus X Kingsbury*, while the agglutinations for typhoid and paratyphoid organisms were negative.

W. F. Harvey.

PAPPATACI FEVER.

COGOLLO DUQUE (José). Una epidemia de papatasi en Arjona, Bolívia (Colombia). [An Outbreak of Pappataci Fever in Arjona.]—*Boletín de la Oficina Sanitaria Panamericana*. 1935. Dec. Vol. 14. No. 1: pp. 1143-1146.

Malaria is usually widespread in November onwards after the heavy rainfall of August and October but dies down early in the year. In March 1935, however, there were many cases of fever and these were at first diagnosed as malaria, but it was soon noticed that the fever lasted for about 3 days only and was accompanied by intense headache and general pains, redness and congestion of the eyes and, in short, the typical symptoms of pappataci fever; epistaxis was not uncommon and in children convulsions occasionally. There was considerable depression with lassitude and asthenia after the fever and convalescence was delayed for 1-2 weeks. The outbreak kept on until July and about 25 per cent. of the population (which was about 15,000) were attacked.

H. H. S.

PESCHLE (Bruno). Osservazioni cliniche su un'epidemia di febbre da papataci. [Observations on an Outbreak of Pappataci Fever.]—*Pediatrics*. 1936. Jan. 1. Vol. 44. No. 1. pp. 41-51. English summary (6 lines).

The author has made an exhaustive clinical study of an outbreak of pappataci fever which occurred in Istria in 1933. Persons of all ages—adults, school children, children of pre-school age, and infants below 2 years—were attacked. Whereas in adults and older children the symptoms and clinical course were typical and presented no difficulty in diagnosis, in the infants and young children many of the characteristic features might be lacking and diagnosis difficult especially in sporadic cases. There is no need here to speak of the classical symptoms of a typical attack, but attention should be called to the differences which the author noted in children. Whereas the fever in adults was about 40°C., in some cases it might be higher in infants, but in still more it kept low, 38°C., and came to normal by the second or third day. Even when it was 40°C., there was no marked constitutional disturbance. The bradycardia, usual in adults, became less with fall in age and in infants was never seen. Convulsions at the onset were seen only in patients over 12 months old and then not unless the fever was high. The persistent redness of face and neck was always present in those over 2 years, lasting even after the fall in the temperature, and was a useful diagnostic sign. Scarlatiniform rashes in the region of the joints were seen in about one-fifth of those of pre-school age; herpes, frequent in adults, was seen only once among the children, a boy of 12 years. Epistaxis, common in adults and in late childhood (40 per cent. of the last showed it), was present in only 5 per cent. of those between 5 and 10 years and not seen at all in infants. Diarrhoea, with loose, mucoid, fetid stools, occurred in 70 per cent. of children of school age, even on the first day of illness; vomiting was present in about half the infants, but never severe; in about 30 per cent. of older children and in 10 per cent. it recurred on successive days. In adults and older children leucopenia with relative lymphocytosis and monocytosis was the rule, but in infants half showed leucocytosis with relative

lymphomononuclear increase, and there was no eosinophilia, in fact in per cent. there was a reduction. Nervous sequelae were never seen in children. Prognosis is always favourable; no fatalities occurred.

H. H. S.

THEODOR (Oskar). **A Study of the Reaction to Phlebotomus Bites with Some Remarks on "Harara."**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. Nov. 25. Vol. 29. No. 3. pp. 273-284.

The reaction to sand-fly bites is allergic in nature. The disease called "harara" in Palestine is the result of these bites in a sensitized subject.

The author studied the effect of successive bites by *Phlebotomus papatasi* on some 17 subjects who had not previously been bitten. After the first occasion of being bitten, the reaction usually takes several days to develop; then intensely itching papules appear. After subsequent bites the papules appear more rapidly (less than one day) and the site of the preceding bites may become inflamed again. This is interpreted as a process of progressive sensitization to the antigen in the insect's saliva. In subjects who have been repeatedly bitten large pale wheals develop locally within a few minutes; and these are followed by the papular reaction. This is regarded as the beginning of desensitization. Ultimately the papular reaction is entirely wanting. Theodor supports the view of DOSTROWSKY that the disease known as "harara" in Palestine is "nothing else than the reaction to phlebotomus bites."

V. B. Wigglesworth.

OROYA FEVER.

WEINMAN (David). Les parasites érythrocytaires révélés par splénectomie: *Bartonella* et *Eperythrozoon*. [*Bartonella* and *Eperythrozoon* revealed by Splenectomy.]—102 pp. [11 pages refs.] 1935. Paris: Amédée Legrand, Editeur, 93 Boulevard St. Germain.

Since the discovery by BARTON in 1901 of the bacillus-like organisms in the blood of a case of Oroya fever and their naming *Bacillus bacilliformis* by STRONG and his co-workers in 1915, and the important observation of MAYER, BORCHARDT and KIKUTH in 1926 of the appearance of similar organisms, which they called *Bartonella muris* in the blood of rats after splenectomy, a very extensive literature has sprung up on the conditions in animals following splenectomy and the occurrence of *Bartonella*, of which a number of new species have been established. In addition an entirely new form, named *Eperythrozoon coccoides* by its discoverer, was noted in splenectomized mice by VICTOR SCHILLING in 1928. Already a number of species of this curious organism have been described, while other types not yet classifiable have come to light. As a subject for a thesis the author has chosen the above-mentioned parasites, and while describing certain experiments of his own has reviewed the 200 to 300 papers which have been published on the subject. This review will undoubtedly be of great service to those who wish to work with these parasites, and is a valuable book of reference.

C. M. Wenyon.

DENGUE.

CHENEY (Garnett). Appearance of a Dengue-like Fever in Northern California.—*Arch. Intern. Med.* 1935. Dec. Vol. 56. No. 6. pp. 1067-1096. With 7 figs. [46 refs.]

Late in the spring of 1934 a patient was seen in San Francisco who presented a clinical picture like that of dengue. Two cc. of whole blood taken from this patient on the 3rd day of fever and inoculated into a volunteer produced the symptoms and signs of inoculation dengue, subinoculations in 3 other successive persons reproduced the same type of illness in each. Five more similar cases were subsequently detected in the city. Full clinical details of all 10 cases are given in the paper with fever charts which show the typical saddle-backed type of fever; severe pains in bones and joints, flushed face and eyes, rash, jaundice and itching of the skin were all noted.

The author prefers for the time being to designate these cases as dengue-like fever for the following reasons:—

(1) The vector of dengue fever *Aedes aegypti* has not been found in Northern California.

(2) It was not possible to prove that these cases were due to a filterable virus.

(3) Nor was it possible to test these people for immunity to the virus of dengue.

D. Harvey.

O'MEARA (F. J.). **Dengue Temperature Charts.**—*Jl. Roy. Army Med. Corps.* 1936. Feb. Vol. 66. No. 2. pp. 120-124. With 7 charts.

Seven specimen temperature charts of cases of dengue are given ; these cases occurred in young male Europeans some in Cairo and some in Calcutta. The cases were mild, bone pains were not severe and did not merit the term "break bone." The majority of the charts are of the typical saddle-back type but one shows the "terminal rise chart" of Rogers.

The Widal and Weil-Felix reactions and blood cultures were negative.

D. H.

TROPICAL OPHTHALMOLOGY.

A REVIEW OF RECENT ARTICLES. XXV.*

Conjunctiva.—KANDA¹ has described a form of *conjunctivitis* accompanied by an acute pustular dermatitis due to the invasion of the conjunctival sac by a flying insect which he calls "*Paederus idae lewis*." The conjunctivitis is frequently complicated by a diffuse superficial keratitis. Complete recovery is usual in a few days; a two per cent. solution of bicarbonate of potassium has been found to be a useful eyewash. [The trouble appears to be closely related to that described by Elliott in his *Tropical Ophthalmology* as caused by "Yellow Moth."]

Trachoma.—MACCALLAN² in his Hunterian Lecture has furnished a comprehensive review of the disease. He describes the changes as a generalized flooding of the subepithelial tissue of the membrane with lymphocytic cells; the follicles which are so often present are part of this general exudate; these, however, differ in no way from the similar aggregations of cells found in follicular conjunctivitis. "The numerous underlying sebaceous or meibomian glands are at first affected by simple blockage of ducts and dilatation, the result of pressure by the cellular infiltration. Later the ducts become strangulated by the developing connective tissue, which begins to take the place of the lymphocytic exudate. The result is the appearance on the surface of the conjunctiva of numerous bleb-like excrescences." He attributes the changes in pannus to an extension of the lymphocytic exudate to the upper part of the limbus by way of the subepithelial tissue of the bulbar conjunctiva. In early trachoma pannus in this area is the only pathognomonic sign of the disease. He emphasizes four main points regarding the disease and its diagnosis.

"(1) The primary epithelial lesion caused by the virus results in an inflammatory reaction in the subepithelial tissue, exhibited by a lymphocytic infiltration. The lymphocytes may be aggregated into follicles, but this is not always the case. When such follicles are present they cannot be distinguished pathologically from similar aggregations of cells which occur in follicular conjunctivitis.

"(2) This lymphocytic invasion of the subepithelial tissue spreads from its area of inception in the tarsal conjunctiva to the corneal limbus, where changes occur peculiar to trachoma.

"(3) The bleb-like excrescences, which exude a gelatinous material when ruptured, have no relation to the so-called trachoma follicles of an earlier stage of the disease.

"(4) The lymphocytic invasion of the subepithelial tissue penetrates the tarsus, and finally is resolved into connective tissue. Hence result the deformities of the lids which occur in no other form of conjunctivitis.

"The last three points differentiate trachoma from any other form of conjunctivitis."

* For the twenty-fourth of this series see Vol. 32, pp. 895-899.

¹ KANDA (Kanji). On the Ocular Affections caused by the Poison of an Insect called "Aoba-arigata-haneka-kushi or *Paederus idae Lewis*."—*Taiwan Igakkai Zasshi* (Jl. Med. Assoc. Formosa). 1935. July. Vol. 34. No. 7 (364). [In Japanese pp. 1004-1012. With 2 figs. English summary pp. 1013-1014.]

² MACCALLAN (A. F.). Trachomatous Conjunctivitis: Its Surgery and Pathology.—*Lancet*. 1936. Jan. 25. pp. 215-217.

The author remarks that ophthalmologists can realize with difficulty that the stigmata of the disease are borne by as many as half the inhabitants of the globe. This seems to the reviewer to exaggerate the incidence of the disease.

JULIANELLE & HARRISON³ have conducted experiments which suggest that the follicular inflammation induced by the inoculation of trachomatous material in the eye of the *M. rhesus* is specific of trachoma. Fourteen monkeys, inoculated with the material from follicular conjunctivitis, remained unaffected, but when subsequently inoculated with trachomatous material developed folliculosis. They conclude that human trachoma can be transmitted to monkeys while human folliculosis cannot. Further investigations⁴ to determine whether the infectious agent in trachoma is filterable tended to show that it is not readily so. MEYERHOF & HABACHI⁵ have found a daily scraping of the conjunctiva followed by friction with some chemical to be successful in the treatment of intractable chronic trachoma. The lids are fully everted after anaesthetization, and the membrane is scraped with a curette or a knife. Scraping is followed by friction with a pledget of wool soaked in perchloride of mercury solution 1 in 1,000, or some other disinfectant. They suppose that the drug used is carried by the vessels directly to the vascularized cornea and there exercises a beneficial action upon the pannus. They recognize, however, that the recovery of a smooth conjunctival surface is the main factor in rendering the cornea more healthy. Treatment may be required for several weeks, or even for several months in severe cases. PAPARCONE⁶ records a diminution from 81 to 60 per 100,000 in the incidence of blindness (of which trachoma is the chief cause) amongst the Italian population during the past twenty-three years. Various factors are responsible, but the chief one is an improvement in hygienic and in housing conditions. DELANOË⁷ has recorded a case of successful human inoculation of acute trachoma. An Arab woman, whose children had recently recovered from a long-standing eye trouble, developed a conjunctival inflammation of great severity. The lids were so swollen that eversion was difficult. The conjunctiva was covered with swollen, readily bleeding, discrete follicles whose projection injured the bulbar conjunctiva and cornea. Pain and lachrymation were marked features. Improvement took place rapidly under treatment with chaulmoogra oil. The patient's husband, who had lost an eye in infancy through smallpox, allowed the conjunctival sac of that eye to be inoculated from his wife. This was effected by using a small wool mop to transfer the infected matter. Both the infected and the healthy membranes were well rubbed with the mops. The husband developed symptoms in a week,

³ JULIANELLE (L. A.) & HARRISON (R. W.). Studies on the Infectivity of Trachoma. II. On the Relation of Human and Simian Folliculosis to the Infection induced by Trachomatous Tissue in Monkeys.—*Amer. Jl. Ophthalm.* 1935. Jan. Vol. 18. No. 1. pp. 10-14.

⁴ JULIANELLE (L. A.) & HARRISON (R. W.). Studies on the Infectivity of Trachoma. III. On the Filterability of the Infectious Agent of Trachoma.—*Amer. Jl. Ophthalm.* 1935. Feb. Vol. 18. No. 2. pp. 133-139. [20 refs.]

⁵ MEYERHOF & HABACHI (S.). D'un mode particulier de traitement des formes rebelles du trachome. (Le raclage journalier).—*Rev. Internat. du Trachome.* 1935. Oct. Vol. 12. No. 4. pp. 189-199.

⁶ PAPARCONE. Sur la diminution du trachome en Italie.—*Rev. Internat. du Trachome.* 1935. Oct. Vol. 12. No. 4. pp. 200-202.

⁷ DELANOË (E.). Un cas d'inoculation du trachome aigu de la femme au mari de cette dernière.—*Rev. Internat. du Trachome.* 1935. Oct. Vol. 12. No. 4. pp. 242-245.

and, on being seen about six weeks later, was found to be suffering from an ophthalmia similar to that of his wife.

SELINGER⁸ recommends the application of quinine to the conjunctiva. He uses a saturated solution of the bisulphate and applies it on a mop with firm stroking movements until the membrane assumes a bluish milky colour; usually about one minute is required. The treatment induces some burning sensation, but is much less painful than the application of copper sulphate. The author believes that the drug's action as a protoplasmic poison enables it to destroy pathological accumulations of lymphoid tissue. He records the notes of eight patients who were benefited by the treatment. THYGESON, PROCTOR & RICHARDS⁹ have recorded an important observation. Epithelial scrapings from the trachomatous eyes of a number of Indian children were found to contain Prowazek-Halberstaedter bodies. The scrapings were suspended in sterile nutrient broth (pH 7.3) ground thoroughly in a mortar for five minutes and passed through hard filter paper to remove cellular debris; this emulsion was then filtered through an Elford graded collodion membrane 0.14 mm. thick and of 0.6 micron average pore diameter. One-third of the filtrate was centrifuged and moderate numbers of elementary bodies were found in the sediment. About 1.6 cc. of the sediment was instilled into the conjunctival sac of a volunteer after the membrane had been lightly scarified with a platinum spatula. An acute conjunctivitis resulted in five days. Prowazek-Halberstaedter bodies and free elementary bodies were present in large numbers. The diagnosis of trachoma was established at the end of six weeks by the occurrence of typical trachomatous pannus. The association of the *Bacterium granulosis* with trachoma in Glasgow has been investigated by MEIGHAN & URQUHART¹⁰. They examined 25 cases which they considered to be undoubtedly trachomatous and succeeded in isolating the micro-organism from 7. In 13 other cases colonies were obtained which had its cultural and morphological characteristics with the exception of glucose fermentation. The authors suggest that failure to isolate the organism from suitable cases of trachoma may sometimes be due to the use of cocaine when obtaining the material and sometimes to having allowed insufficient time for the colonies to develop.

Cataract.—WRIGHT & KOMAN NAYAR¹¹ operating on a child aged thirteen months for bilateral congenital cataract found that in the lens of one eye there was a solid cataractous foetal nucleus surrounded by a milky fluid; this was enclosed in turn by an opaque friable shell of cortex. The cataract in the other eye was of a mixed consistence, partly milky and partly friable. The child had suffered from ophthalmia neonatorum from its birth. KHALIL¹² describes Lopez Lacarrère's

⁸ SELINGER (Elias). Local Quinine Therapy in Trachoma. Preliminary Report. —*Amer. Jl. Ophthalm.* 1935. July. Vol. 18. No. 7. pp. 631-636. [11 refs.]

⁹ THYGESON (P.), PROCTOR (F. I.) & RICHARDS (P). Etiologic Significance of the Elementary Body in Trachoma.—*Amer. Jl. Ophthalm.* 1935. Sept. Vol. 18. No. 9 pp. 811-813. [12 refs.]

¹⁰ MEIGHAN (S. Spence) & URQUHART (Mary). Trachoma: an Investigation into the Question of the Presence of *Bacterium granulosis* (Noguchi) in Cases of Trachoma in Glasgow.—*Brit. Jl. Ophthalm.* 1936. Apr. Vol. 20. No. 4. pp. 201-204.

¹¹ WRIGHT (R. E.) & KOMAN NAYAR (K.). Rare Type of Congenital Cataract.—*Amer. Jl. Ophthalm.* 1935. Feb. Vol. 18. No. 2. p. 158.

¹² KHALIL (M.). The Extraction of Cataract by the Electro-Diafaco Method (after Lopez Lacarrère of Madrid).—*Brit. Jl. Ophthalm.* 1936. Mar. Vol. 20. No. 3. pp. 167-175. With 2 figs. [14 refs.]

method of cataract extraction by diathermy needle. A special needle is used to penetrate the lens: this structure coagulates and becomes firmly adherent when the current is turned on. The lens can then be lifted out on the needle. Penetration of the lens is very easy and adhesion firm. Regulation of the current is important in order to avoid insufficient coagulation or an injury to the neighbouring structures. By this technique all pressure on the globe is avoided and there is no danger of dislocating the lens backwards. Khalil suggests that the necessary strength of current may be estimated by placing a piece of raw meat on the patient's forehead before operation and testing the resistance. Only experience can prove whether the advantages of this operation can compensate for the dangers.

Glaucoma.—KIRWAN¹³ has described the characteristic features of the type of glaucoma which is associated with *epidemic dropsy*. Both eyes are usually affected and haloes round lights are a constant subjective symptom. The capillaries of the entire uveal system dilate and an increased permeability of their walls leads to an excessive flow of fluid into the anterior ocular segment. The eye remains white and the pupil remains normal although the intraocular pressure is always of a very high order—rarely below 50 mm. The depth of the anterior chamber is either normal or deeper than normal. Cupping of the optic disc is only found in long-standing cases. The high intraocular pressure does not respond to purgation or to meiotics; indeed it is advisable to avoid the use of eserine. Trephining should be performed as soon as the visual field is affected. Gastro-intestinal lavage may aid the elimination of bacteria and their toxins. A rice-free diet should be adopted and the patient be advised a change of air from the endemic area. The aqueous humour in these cases has been found to contain a toxin resembling histamine, and it is suggested that this is probably the product of specific micro-organisms in the alimentary canal. Kirwan states that "if we can find out the organism and its toxin that is the cause of epidemic dropsy, we have advanced a considerable distance in the elucidation of the whole glaucoma problem."

Sleeping sickness.—BERTRAND¹⁴ has found that *optic atrophy* is fairly common amongst the inhabitants of Togoland. One type of the disease is secondary to a choroiditis and another type is exactly similar to that which follows arsenical treatment. These diseases are found in persons otherwise apparently healthy as well as in treated and in untreated trypanosomiasis patients. Syphilis is stated to be an unlikely cause of the atrophy as this disease is extraordinarily rare in the country. The author urges that an optic atrophy should not be attributed to trypanosomiasis unless the eye had been proved by ophthalmoscopic examination to have been healthy before the treatment was begun.

Leprosy.—BARROS¹⁵ has found that the acute varieties of leprotic ocular inflammation respond best to some form of desensitization treatment, especially to autohaemotherapy; specific treatment should be temporarily suspended during its employment, but ordinary local

¹³ KIRWAN (E. O'G.). The Ocular Complications of Epidemic Dropsy.—*Indian Med. Gaz.* 1935. Sept. Vol. 70. No. 9. pp. 485-489. With 3 charts & 4 figs. on 1 plate.

¹⁴ BERTRAND (Y.). Réflexions sur certaines lésions du fond d'oeil observées en pays Cabrais.—*Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 606-611.

¹⁵ BARROS (J. Mendonça). Lepra ocular—tratamento.—*Rev. Leprologia de São Paulo.* 1935. Num. especial. pp. 103-107.

treatment should be carried out. Episclero-conjunctival lepromata and hyperplastic forms of keratitis should be treated by excision and cauterization. Treatment by gold salts has proved disappointing. AMENDOLA¹⁶ stresses the advantages of tarsorrhaphy in cases of paralysis of the orbicularis caused by the disease. Marked involvement of the iris is considered by him to contraindicate an iridectomy. Hyperplastic lesions of the cornea should be operated on "for it brings about an arrest in the course of the disease (Pinkelton's rule)." Treatment of acute ocular lesions should be adapted to the circumstances of the individual patient.

Cholera.—BHADURI¹⁷ has recorded some observations on the ocular complications of cholera. These complications are mostly due to the great loss of fluid by purging, though toxic factors, too, may play a part. Defective lachrymation renders the conjunctiva and cornea vulnerable to secondary infections; corneal sensation and the blinking reflex are also impaired so that the normal transparency of the cornea is likely to be diminished. Intraocular pressure is lowered and varies inversely with the specific gravity of the blood. No vitreous or lenticular changes could be exclusively attributed to the acute stage of the disease; but keratomalacia might set in if convalescence was unduly delayed by complications.

Epidemic Dropsy.—BHADURI¹⁸ reports a case of *papilloedema* which occurred during an attack of epidemic dropsy. Both eyes were involved and haemorrhages had occurred in that most affected. Ocular tension was raised, and the eye with the higher tension showed less swelling of the nerve. Central and peripheral vision was excellent in each eye, but both blind spots were slightly enlarged.

The Egyptian Government's Twenty-Second Annual Report of the Ophthalmic Hospital Section for 1934¹⁹ presents the usual valuable statistics, and indicates the active interest taken by the authorities in the prevention and treatment of eye disease in that country. The figures show that 80 per cent. of the existing blindness is due to some conjunctival trouble, and that 39,478 cases of gonococcal conjunctivitis, 21,758 of Koch-Weeks and 884,149 of all forms of trachoma were treated during the year. Considerable attention is given to ophthalmic treatment in schools; it would appear that 98 per cent. of the scholars were trachomatous at the beginning of the year and about the same number at the end of the period, a fall in the number of the early cases being associated with an increase in that of the cicatricial. A chart demonstrates how closely the prevalence of eye disease rises and falls with the atmospheric temperature.

¹⁶ AMENDOLA (Francisco). Considerações sobre o tratamento das complicações oculares na lepra.—*Rev. Leprologia de São Paulo*. 1935. Num especial. pp. 108-114. With 4 figs. on 1 plate.

¹⁷ BHADURI (B. N.). Ocular Complications in Cholera.—*Calcutta Med. Jl.* 1935. Oct. Vol. 30. No. 4. pp. 219-224.

¹⁸ BHADURI (B. N.). Papilloedema in Epidemic Dropsy.—*Calcutta Med. Jl.* 1935. Aug. Vol. 30. No. 2. pp. 91-94. With 4 figs. (2 coloured) on 2 plates.

¹⁹ EGYPT: Ministry of the Interior. Department of Public Health. Ophthalmic Hospitals Section. Twenty-Second Annual Report of the Ophthalmic Hospitals Section, for 1934.—46 pp. With 1 folding chart & 1 folding map. 1935. Cairo. [P.T. 12.]

As might be expected, the ninth Annual Report of the Giza Memorial Laboratory²⁰ for the year 1934 covers much of the same ground as the above, but enters more fully into details and furnishes particulars regarding the pathological and clinical research undertaken during the year. Various interesting and excellently illustrated cases are recorded.

It is stated that smallpox is a very unusual cause of blindness in Egypt—a contrast to some tropical countries. The research department dealt largely with gonococcal ophthalmia and trachoma. Ophthalmia neonatorum is a very rare disease in Egypt, and gonococcal ophthalmia, though so prevalent, has no clinical or epidemiological connexion with gonococcal urethritis. Dr. Ibrahim AHMED made a study of the biological character of the different strains of gonococci found in the conjunctival sac. The organisms were classified into three groups according to their antigenetic complexity—high, low, and medium; the ophthalmic strains mostly belonged to the medium group with an inclination towards the high group. It is important to note that gonococci could always be found in the conjunctival epithelium at the time of the patient's discharge from hospital apparently cured. The Director, Dr. Rowland WILSON, makes some interesting remarks regarding the Prowazek-Halberstaedter body. Some observers consider that the "Elementary bodies," which constitute the cell inclusion, represent the actual virus of trachoma and that this virus is filterable, human inoculations of bacteria-free filtrate containing elementary bodies having given rise to experimental trachoma. Egyptian investigators, however, have failed to find the inclusion in cases of the disease not complicated by a secondary infection. He asks the pertinent question: "Are we therefore dealing with two different diseases?" The proprietary remedy "Arolid" was tried in the treatment of the disease and found not entirely satisfactory. F. H. STEWART found that there is still no clear proof that trachoma virus can pass gradocol membranes of *a.p.d.* 0.6–0.7 μ . WILSON & EL TOBGY discuss the influence of the endemic diseases on ocular troubles. Bilharzia appears to have little effect nor could any particular trouble be attributed to ankylostomiasis. Helminthiasis seemed, however, to be responsible for much of the xerotic infections. [But it must be remembered that helminthiasis and malnutrition are frequently associated.]

H. Kirkpatrick.

²⁰ CAIRO. Ninth Annual Report of the Giza Memorial Ophthalmic Laboratory 1934 [WILSON (Rowland P.), Director].—150 pp. With numerous illustrations. 1935. [25 P.T.]

MISCELLANEOUS.

LARSEN (Albert E.). **Variation of Cosmopolitan Diseases in Tropical and Temperate Zones.**—*Amer. Jl. Trop. Med.* 1936. Jan. Vol. 16. No. 1. pp. 91–100. [22 refs.]

The author selects for discussion cosmopolitan diseases said to differ in incidence and manifestation in tropical and temperate climates. They are—rheumatic fever, scarlet fever, diphtheria, stone in the gall and urinary bladders, cirrhosis of liver, appendicitis, gastric ulcer, cancer, general paralysis and tabes. The 22 papers from which his figures are drawn have all, or nearly all, been noted in this *Bulletin*. A good instance of the truth that reported incidence of a disease depends on opportunity to observe it is that of general paralysis and tabes in Siam. MONTEL among 150,000 patients seen over a period of 23 years saw two cases of general paralysis, whereas MOTAIS, an ophthalmologist, found a "high incidence" of optic atrophy, Argyll-Robertson pupils, lightning pains and ataxia [see this *Bulletin*, 1926, Vol. 23, p. 936]. Larsen states that scarlet fever "has not been reported from Africa."

A. G. Bagshawe.

[Scarlet fever, though rare in tropical Africa, has been reported from British African Colonies (*e.g.*, Kenya), from Egypt, from French African Colonies, from the Belgian Congo and elsewhere: also positive Dick reactions are sufficiently often obtained in natives to indicate that they are not altogether immune from scarlet fever.—Ed.]

NATIONAL ECONOMIC COUNCIL. **Annual Report of the Central Field Health Station January-December 1934** [LIU (J. H.), Director & KING (P. Z.), Vice-Director].—69 pp. With 1 plate, 4 maps & 5 figs. 1935. Nanking, China, R.C.24.

The following is extracted from a fuller account appearing in the *Bulletin of Hygiene*. The parts here given, it was thought, would be of interest to readers of this *Bulletin*.

III. The *Department of Parasitology* carried out a malaria mosquito survey in Nanking city and two others in the vicinity, at Pakwachow and Sanchaho. At the former of these the spleen rate among 170 school children was 2.6 and the parasite rate 1.6 per cent. Other more distant surveys were made. At Chüjung Hsien a severe outbreak of malaria occurred in the autumn of 1933. In 1934 among 2,000 examined [? all school children or adults also] the spleen rate was 10.0 and parasite rate 8.7. Of 4,108 examined in Kiangsi Province, 19 cities, 54 to 86 per cent. of the troops were found infected, and in 92–97 per cent. the infection was subtertian. Infection had taken place mostly at the Fukien-Kiangsi border. Research included a study of the hibernation of *Anopheles* in Nanking; on the species present (some have maintained that *A. hyrcanus sinensis* is the only one found in Nanking, but this is probably not the fact); the precipitin tests for sources of feeding; larvicidal fish.

At Tsingkiangpu is a *Kala-azar Research Station*. A preliminary survey was made to find a suitable location for a permanent kala azar

field unit and in the place selected among 172 houses and 982 persons examined 116 and 242 respectively were found infected, or 67.4 and 24.6 per cent. The greatest house infection rate was 83.3 per cent. in Liuchuan and the highest in persons 31.5 per cent. in Chengchuan.

For Helminthological investigations antischistosomiasis units have been established in Kutang near Hangchow, and Chü Hsien; another to study the epidemiology of Paragonimiasis in Shaohing, Chekiang, and of Fasciolopsis infestation in Shanghai and of both the first and last in Chinkiang. The department has published a *Guide to the Laboratory Diagnosis of Human Helminths* (in Chinese).

Geographical Distribution of Certain Diseases Prevalent in China.

<i>Disease.</i>	<i>Distribution.</i>
Amoebic Dysentery...	More prevalent in Central and South China.
Ascariasis ...	Common throughout China.
Bacillary Dysentery ...	Endemic throughout China.
Beriberi ...	More prevalent in coastal provinces such as Kwangtung, Fukien and Chekiang.
Cestodes ...	Moderately prevalent in North China.
Cholera ...	Sometimes epidemic in coastal provinces and Yang Tze Valley. (About 100,000 cases were reported in 1932. Only 7 sporadic cases were reported in 1933 and 6 in 1934).
Clonorchiasis sinensis ...	Prevalent in Kwangtung.
Dengue Fever ...	Sporadic in South China.
Diphtheria ...	More common and more severe in North China.
Elephantiasis ...	Comparatively common in Kiangsu and Fukien.
Epidemic Meningitis ...	More prevalent in the Yang Tze Valley.
Fasciolopsiasis (<i>F. buskii</i>) ...	Endemic in Chekiang, especially in Shaohing (Shaohsing).
Hookworm Disease ...	More common in Central China.
Leishmaniasis Donovanii ... (Kala-azar)	Prevalent north of Yang Tze River, especially in Shantung, North Kiangsu, and North Anhwei.
Malaria ...	Prevalent in South and Central China; rare in the North-west.
Measles ...	Endemic throughout China.
Paragonimiasis Westermanii ...	Sporadic in Coastal provinces.
Plague ...	Sporadic in Fukien; reported epidemic in Shansi, Shensi, and Suiyuan in 1928-29 and in Shansi and Shensi in 1931.
Relapsing Fever ... (<i>S. recurrentis</i>).	More prevalent in North China.
Scarlet Fever ...	More common and more severe in North China.
Schistosomiasis ...	Prevalent in lower Yang Tze region.
Smallpox ...	More common in rural areas.
Syphilis ...	Common in large cities.
Trachoma ...	Common throughout China.
Tuberculosis ...	Common throughout China.
Typhoid and Paratyphoid Fevers.	Endemic throughout China.
Typhus Fever ...	Sporadic in South China; endemic in North China.

H. H. S.

ANIGSTEIN (Ludwik). **First Report on the Medical Survey of Liberia (Central Province of the Hinterland).**—8 pp. 1936. Jan. Govt. Printing Office, (Dept. of State), Monrovia, Liberia.

The survey, which occupied three weeks during which 200 miles were traversed, was directed mainly to the incidence of malaria, yaws, and leprosy, to smallpox vaccination and infant mortality. A mass clinical examination of the population was carried out and when possible blood samples were taken.

Malaria.—Of 1,022 children whose spleens were palpated, in 656 or 64 per cent. enlargement was detected, indicating hyperendemic malaria. The method was that of SCHÜFFNER, all but about a hundred being of Grades I and II (lesser enlargement) and 13 spleens reaching the navel (Grade IV).

Yaws is widely distributed and it is stated that every patient admitted to the hospital of the Firestone Plantations receives an anti-yaws treatment. Of the 1,022 children 80 had a typical yaws eruption and "crab yaws" was noted in 593 of 1,504 adults; arthritis of finger and toe joints, possibly due to yaws, was frequent. The author comments on the disablement entailed by crab yaws.

Leprosy in its advanced state is recognized by the people and the victims are exiled to the bush. The author saw 19 trophoneurotic and nodular forms, 18 in one town, all very severe.

According to a former estimate there are about 2,000 lepers in Liberia.

The technique of a vaccinating sanitary inspector was observed; it is criticized as likely to lead to infection and to the apprehension which is general among the natives.

The infant mortality was studied by questioning 272 mothers, the conclusion is that it approaches 450 per mille. Recommendations are made for the improvement of health. Four tables give details of the results of the survey in a number of towns. *A. G. Bagshawe.*

BLANCHARD. **L'École de Médecine de l'Afrique Occidentale Française de sa fondation à l'année 1934.** [**History of the School of Medicine at Dakar, French West Africa.**—*Ann. de Méd. et de Pharm. Colon.* 1935. Jan.-Feb.-Mar. Vol. 33. No. 1. pp. 90-111.]

To those who take part or are interested in medical education in British Colonies and those who may contemplate undertaking medical education in Colonies or Dependencies where institutions for this purpose do not at present exist the following account of the French West African School of Medicine will be informative.

The school was opened in Dakar on 1st November, 1918, with a view of training native men to become medical practitioners, native women for midwives, and giving instruction also to veterinary pupils. A year later a section for veterinary medicine and another for pharmacy were inaugurated. In 1924 the veterinary section was moved to Bamako. The original decrees were subsequently modified, changed and added to, and the school is now regulated by those of 1927 and 1930, and by the last a section of visiting nurses was established.

Most of the medical and pharmacy students come from the William Ponty School in the Isle of Gorée, and this school itself obtains its pupils from other, higher grade, schools in the country, the pupils having by that time had 8-9 years' teaching and being at least 17 years

old. At the end of a year in the William Ponty School the teachers meet to decide concerning the fitness of the pupils, and divide them into those who will continue with teaching and education and those who may branch off to medicine. During the next year the latter, in addition to general subjects, also specialize in natural science, physics and chemistry. They then undergo examination preparatory to entering the School of Medicine. The examination appears to be no easy matter ; it comprises dictation and questions which include two on Greek and Latin roots, French composition, mathematics, physics and chemistry. Prior to admission they have to be passed as physically fit and to give a promise to serve as Native Medical Assistants for 10 years dating from their appointment to the roster ; the declaration is signed by the father or guardian. If this is violated, except on ground of ill-health, the money spent on the boy's education has to be refunded to Government.

Prospective midwives have to be between the ages of 18 and 25 years and to have attained a certain standard of education, tested by examination in spelling and writing, in French composition and arithmetic. Since 1932 there has been an average of 70 candidates for 20 vacancies.

Since 1921 and till 1934 there have been 148 qualified as doctors, 21 as pharmacists, 191 as midwives and 38 as visiting nurses. The courses are 4 years for doctors, 3 for pharmacists or midwives, and 2 for the nurses.

The medical school is under a Director who is in nominal charge of the hospital and the various clinics and is administrator in chief ; he is aided by an Assistant Director who also is in charge of the discipline of the students. A Matron is in control of the midwives' section and sees to their training and general discipline and also that of the visiting nurses. There is a School Council of the professors and teachers to discuss the curriculum and any changes of it, classifying the students after examination, referring for further study those who fail to attain the required standard.

In 1931 the school was moved to new buildings which are said to be very fine, up to date and well equipped, with library, laboratories, demonstration and lecture rooms, cinema apparatus, anatomy room with receptacles for preservation of bodies, etc. The students wear uniform. A time-table of the work is given.

The hospital services comprise special departments and clinics : for fractures instituted in 1919, for tuberculosis in the following year ; a special block for mental patients was constructed in 1923, for women and children, for eye, ear, nose and throat diseases, and for skin and venereal affections in 1931 when the transfer to new buildings took place. The number of in-patients in 1934 was nearly 5,000. A Maternity Department was opened at the end of 1931 with 60 beds for women and 60 for infants. Finally, a polyclinic was started at the school but was too far from the town and it was therefore moved there in June 1929. It comprises : consultation rooms, a tuberculosis dispensary, consultations for respiratory diseases, dispensary for venereal patients and a dermatological department, consultations for ophthalmic and aural conditions, and a dental department, a prenatal, gynaecological and infant welfare section.

After being in practice 6-8 years the native medical practitioners return for a postgraduate course of 6 months and an examination for promotion to Assistant Medical Officer, of the First Class. The courses for pharmacists and for midwives are equally thorough. Many points

other than those referred to above are included in the full account, but these remarks will suffice to show the activities of the Dakar School of Medicine.

H. H. S.

BLANCHARD. La formation des auxiliaires médicaux dans les colonies françaises. L'École de Médecine de l'Afrique Occidentale Française à Dakar. [*Medical Assistance in the French Colonies. The Dakar School of Medicine.*—*Bull. Office Internat. d'Hyg. Publique.* 1935. Aug. Vol. 27. No. 8. pp. 1575–1592. With 4 figs. on 2 plates.

The Dakar school was opened at the end of 1918 and has afforded training for medical men, veterinarians, pharmacists, nurses and midwives. Its pupils are drawn from the Sudan, Senegal, Dahomey, the Ivory Coast, Guiana, Sierra Leone, Nigeria, Togo, Liberia and Haute Volta. The course is 4 years for medical students, 3 for pharmacists and midwives. There is a Director and Assistant Director, nominated by the Governor General of French West Africa, with a Board of Professors. The article gives accounts of the curriculum, the clinical and other facilities, the examinations and the prospects of those who undergo training at the school. Illustrations are given of the buildings, the maternity section, the operating room and a laboratory, which show the buildings to be handsome and substantial and the interior well equipped.

H. H. S.

FEDERATED MALAY STATES. *Annual Report of the Institute for Medical Research for the Year 1933* [MARTIN (P. H.), Acting Director].—143 pp. 1934. Kuala Lumpur. F.M.S. Govt. Press.

This excellent report covers a wide range. The main subjects of research were malaria and tropical typhus, and except for a note to the effect that there were two cases of melioidosis—one in a man and one in a dog—these are the only sections of the report dealt with in this summary.

Malaria.—Dr. Richard Green continued his investigations into the use of atabrin. In the Annual Report for the previous year (this *Bulletin*, 1934, Vol. 31, p. 728), he reported that in the treatment of hospital patients there were fewer relapses after a course of atabrin than after a course of quinine. He has now tried it on rubber estates, beginning with a mass treatment of the whole population and subsequently treating all cases of fever which occurred. The results were excellent; during the whole period the working efficiency of the labourers was maintained at a high level; during the most malarious season only 2 per cent. of the available working days were lost owing to fever. The results of quinine treatment, as it is usually given on estates, were much less satisfactory. This is not attributed to the inferiority of quinine, but to the difficulty of giving it. Quinine costs only about a third of the price of atabrin, and if it were given in curative doses over short periods it might prove more satisfactory than atabrin. The usual practice on estates is the haphazard administration of quinine in sub-curative doses which have little effect. The estate dresser may wish to give more quinine, but the labourers will not take it because it produces symptoms of cinchonism and interferes with their work. "The poor results obtained among the quinine-treated group were regarded as no condemnation of quinine but rather as a demonstration of the wastefulness and

ineffectiveness of giving long-continued and interrupted courses of quinine in a dosage averaging about ten grains daily." The great advantage of atabrin is the willingness with which the labourer takes it. "The fact that the daily dose of atabrin can be given at one muster, also the willingness of estate labourers to take atabrin without fear of cinchonism, both assume an importance in obtaining efficient treatment." There are many difficulties in the way of drug control; one is the continual change in the personnel of the labour force; "in certain circumstances the rate of change in the estate populations may be so rapid that whether atabrin or quinine is to be used would become a matter of indifference."

It can hardly be expected that the results of atabrin administered by the staff of an estate, as a part of the ordinary routine, will equal the results of treatment by experts during a special investigation. Much depends on the dresser in charge; on most estates he has no microscope and cannot distinguish between malaria and fevers of non-malarial origin. During the course of this investigation it was found that only 58 per cent. of the cases of fever were due to malaria. Dr. Green concluded that atabrin was the best drug available for giving "mass" or "blanket" treatments, because quinine administered in curative doses gives rise to symptoms of cinchonism which render the labourers unfit for work; but "at no time, during any of the experiments with atabrin, was justification found for reduction of the oiling programme just because mass treatments with atabrin were being given."

Dr. Green has made a number of investigations into the relative avidity for human blood of the various Malayan species of anophelines when placed in feeding cages. The most avid was *A. maculatus*: 71 per cent. of 2,688 took human blood; *A. hyrcanus* var. *ngerrimus* came next with 57; *A. aconitis*, 43; *A. philippinensis* and *A. hyrcanus* var. *sinensis* 37; *A. subpictus* 31; *A. barbirostris* 28; *A. sundanicus* 21 per cent.

Attention is drawn to the difficulty of distinguishing the oöcysts of *P. falciparum* and *P. vivax* from those of the monkey parasite, *P. inui*, at certain stages of development. The position has been further complicated by the finding of malarial parasites in other Malayan mammals the flying fox, the common squirrel and the house bat.

The Entomologist, Mr. E. P. Hodgson, carried out special investigations on a rubber estate. He found that the maximum incidence of *A. maculatus* occurred at the end of March, with a secondary rise in September. The larval densities of *A. maculatus* and *A. karwari* were found to correspond closely with the adult densities, contrary to the findings of workers in other parts of the country. Precipitin tests were made with blood from wild anophelines, and the results showed that *A. maculatus* was predominantly anthropophilic; 84 per cent. of this species contained human blood as compared with an average of 24 per cent. for other species. Two of these others, *A. barbirostris* and *A. hyrcanus*, appear to be facultative zoophiles; they act as carriers in the towns where the population is dense and where there are few animals. An outbreak due to these mosquitoes is reported from a low-lying district in the town of Batu Gajah, where nearly 3 per cent. of the *A. barbirostris* were found to be infected. Experiments were made with Professor Williamson's sluicing method of control. This method consists of the construction of reservoirs in the course of a stream, the object being to wash away the larvae at intervals by releasing the

dammed-up water. The results were not successful, owing to the friable soil of the lowlands the flood gates were repeatedly washed away, and the necessary alterations in the shape of the drains increased the number of breeding places. Many other interesting observations are recorded; for example, *A. baeri* and *A. sundaicus* (*ludlowi*) were found breeding by the sea in pools with a salt content of about one-third that of sea water.

Tropical typhus and Japanese river fever.—Dr. R. Lewthwaite and Dr. S. R. Savor continued their investigation into the viruses of tropical typhus and Japanese river fever. They have carried on the "Seerangayee" strain of the rural, scrub, or "K" type of tropical typhus in guineapigs to the 58th generation, and the "Manikam," urban, or "W" strain to the 46th. The "Wellington" strain of Japanese river fever is now in its 54th generation in the eyes of rabbits. Cross-immunity tests were made with the three strains, using the intraocular method in rabbits, and the previous year's findings (in guineapigs) were confirmed, *viz.*, that while the viruses of scrub typhus and Japanese river fever are immunologically the same, there is no cross immunity between these viruses and that of the urban or "W" form of tropical typhus.

Unlike "*le typhus murin*" of Nicolle, the virus of the "K" type does not produce a well marked reaction in white rats. The "Seerangayee" or "K" strain has never produced a macroscopic scrotal swelling in guineapigs, or local rats, such as is produced by the "Manikam" or "W" strain. An attempt was made to immunize guineapigs against the "K" strain by the inoculation of formalinized brain passage virus, but no protection resulted.

Cross immunity tests with the virus of Rocky Mountain spotted fever and the viruses of the two types of tropical typhus showed that there was no cross immunity between them. The spotted fever virus was sent to the laboratory from Montana, U.S.A., in infected ticks. No difficulty was experienced in maintaining it in guineapigs, it nearly always caused scrotal swelling, it was difficult to maintain in rabbits' eyes, it produced *X19*, not *XK*, agglutinins. In short, it was more nearly related to the urban or "W" strain of tropical typhus than to the rural or "K" strain.

W. Fletcher.

FEDERATED MALAY STATES. *Annual Report of the Institute for Medical Research for the Year 1934* [KINGSBURY (A. Neave), Director].—107 pp. 1935. Kuala Lumpur: Govt. Press.

Among items of special interest in this Report are:—

(1) Evidence that, in ordinary estate practice, a short course of quinine is as efficient as a course of atabrin and costs only a fifth of the price.

(2) The importance of *A. barbirostris* as a carrier in the Malay States.

(3) The demonstration that the intradermal inoculation of the virus of rural tropical typhus produces a primary lesion like that of Japanese river fever.

(4) The proof that urban tropical typhus is carried by fleas.

Dr. Richard Green continued his work on the relative value of quinine and atabrin in the treatment of labourers on rubber estates. The theoretical advantages emphasized in his earlier reports would apply mainly to groups of labourers who were members of a stable population residing in an area where opportunities for re-infection

with malaria parasites were few. He has now investigated the use of atabrin on rubber estates under essentially practical conditions, and has carried out a series of experiments in order to determine how the results of short curative courses of quinine, 20 grains a day for one week, compare with those of six-day courses of atabrin. He found that "the treatment of fever cases in the atabrin group cost about four times as much as the treatment of such cases in the quinine group. The general efficacy of treatment was found, however, to be similar in each group, *i.e.*, in the quinine group approximately the same results were obtained at about one-quarter of the cost . . . atabrin is used to its best advantages when 'mass' treatments consisting of curative doses are given for periods of 6 days to labourers on estates." These mass treatments are recommended once monthly during malarious seasons and every two months during comparatively non-malarious seasons.

Experiments made with the object of determining the shortest period within which anopheles are able to transmit malaria showed that most species fed readily two days after emergence from the pupa and that eight days later many of them were capable of transmitting malaria. The maximum duration of life, in the laboratory, of 14 different species of Malayan anopheles was from 36 to 66 days, and the average life of most species was about one month.

Mr. E. P. Hodgkin, the entomologist, continued the trapping of mosquitoes in human-baited traps. In the Report for 1933, it was mentioned that *A. barbirostris* had been found responsible for an outbreak of malaria in the town of Batu Gajah and, during 1934, it was found to be a carrier in the coastal districts.

Tropical Typhus and Japanese River Fever.—Drs. R. Lewthwaite and S. R. Savorr continued their work on these diseases. The following strains of virus are maintained in the laboratory :—

1. "Seerangayee" K, or rural tropical typhus, 92nd generation in guineapigs.
2. "Mannikam" W, or urban tropical typhus, 84th generation in guineapigs
3. "Raub" (formerly "Wellington") Japanese river fever, 87th generation in rabbit's eyes.
4. "Kepong", Japanese river fever, established during the year.

Drs. Lewthwaite and Savorr have already demonstrated the identity of the viruses of rural typhus and Japanese river fever. The only difference between the two diseases is the absence of the initial ulcer in the first and its presence in the second. Experiments were made during 1934 to determine if the virus of rural tropical typhus would produce an initial ulcer resembling that seen in Japanese river fever, if it were inoculated intradermally. For this purpose, rabbits and monkeys were inoculated intradermally with the Seerangayee strain of rural typhus and also with the Raub strain of Japanese river fever. The results were the same in both cases ; a papule appeared at the site of inoculation which became a small circumscribed ulcer with a black necrotic centre and a surrounding red areola ; a leucopenia and a positive Weil-Felix reaction (*OXX* being agglutinated) occurred in both cases. These experiments confirm the identity of the viruses, and it is suggested that the difference between tropical typhus, in which there is no initial ulcer, and Japanese river fever, in which an ulcer is the characteristic feature, depends in nature on a difference in the route of inoculation of the virus ; in one it may be subcutaneous and in the other intracutaneous.

The experiments with the virus of Rocky Mountain fever, mentioned in last year's Report, were continued during 1934. They confirmed the finding that there was no cross immunity between this virus and that of rural tropical typhus; but with reference to urban tropical typhus, it was found that though a past infection with this did not protect against Rocky Mountain fever, nevertheless an infection with Rocky Mountain fever did give some degree of protection against urban tropical typhus.

Experiments made with the ticks *Dermacentor andersoni* and *Rhipicephalus sanguineus*, the vectors of Rocky Mountain fever and fièvre boutonneuse, afforded no evidence that they could transmit, or even acquire, the viruses of either the rural or urban form of tropical typhus.

A series of experiments with rat-fleas (*X. cheopis*) and white rats infected with urban tropical typhus demonstrated that this flea becomes infected when it feeds on infected rats. Innumerable Rickettsia are found in the gut and it transmits the infection when it feeds on clean rats. "These experimental findings leave little doubt that, in nature, the rat-flea is a vector of urban typhus from rat to rat and from rat to man."

The preparation and use of antirabic vaccine was continued; for human patients, 2 per cent. sheep's brain in 0.5 per cent. carbolic saline; for dogs 20 per cent. bullock's brain in 0.5 per cent. carbolic saline. The mass inoculation of dogs in Kuala Lumpur has now been in force for 3 years in succession, and again no case of rabies has been reported.

Brilliant green has been used in some smallpox lymph stations to spray calves with the object of reducing the bacterial content of the lymph. This method was tried during the year at Kuala Lumpur but it was found to reduce the potency of the lymph without, to any great extent, reducing the number of organisms.

Other investigations included: typing of pneumococci, the colloidal paraffin reaction in the cerebrospinal fluid, the examination of the cerebrospinal fluid in leprosy, the Ascheim-Zondek test for pregnancy, the chloramine treatment of water and the testing of rat-virus.

In the Division of Chemistry, under Mr. R. W. Blair, the preparation of an extract of rice polishings for the prevention and treatment of beriberi has been continued. This extract, which is issued in the form of tablets or powder, was found to contain 100 international vitamin B units per gram, or, weight for weight, about 4 times more than marmite. Considerable attention has been given to water supplies; bacteriological and chemical examinations have been made regularly, and the raw waters of the majority of the water supplies have been examined spectrographically for the presence of mineral constituents.

W. Fletcher.

MAURITIUS. ANNUAL REPORT ON THE MEDICAL AND HEALTH DEPARTMENT 1st JANUARY TO 31st DECEMBER, 1934 [KIRK (J. Balfour), Director]. Appendix I. pp. 29-47.—**Annual Report of the Bacteriological Laboratory for the Year 1934** [ADAMS (A. R. D.), Senior Pathologist and Superintendent]
 —. Appendix I.A. pp. 48-50.—**Annual Report of the Government Analyst for the Year 1934** [STOYLE (J. A. R.)].

Two reports are included in this, *viz.*, that of Dr. A. R. D. Adams on the work of the Bacteriological Laboratory and that of Mr. J. A. R.

Stoyle, the Government Analyst. The latter report, though of importance to the Island, calls for little comment. During the year 1,715 samples were dealt with, a 16 per cent. increase on the return of the previous year. The work was of a routine nature, comprising biochemical examinations for the Medical and Health Services, medico-legal investigations, analyses of milk and food, and work for the Police, Customs, and Public Works departments.

The work at the Bacteriological Laboratory may be divided into (1) Routine ; (2) Research. The former includes Kahn tests, Widal tests, preparation of vaccines, including the usual enterica group and human and bovine BCG, bacterial analyses of public and private water samples, etc. ; altogether 9,633 specimens were dealt with, of which 2,444 were pathological. Among the faecal specimens the commonest helminth ova found were those of *Trichuris trichiura* (593), those of hookworm next, but less than half (285) and ascaris third (246). The most frequent protozoal finding was *E. histolytica* (47). Water samples totalled 446 ; fortnightly examinations were made of 6-10 samples of water from various parts of the Mare-aux-Vacoas supply. The water is often turbid and odorous, due to the filters becoming charged with *Beggiatoa*.

Interesting cases of schistosomal salpingitis (*Sch. haematobium*) are reported and one other particularly noteworthy. An Indian boy of 14 years was very heavily infested with *S. haematobium*, as many as 1,500-2,500 ova being found per cc. of urine. He had a sharp attack of malaria ; *P. falciparum* was seen in his blood and quinine sulphate, 45 grains, was given for 3 days. The attack subsided and the ova of schistosomes practically disappeared, prolonged search revealing only a few and these damaged and non-viable. It is conjectured that the cure of the schistosomiasis was due to the high fever (105°F.) rather than to the quinine or that it was a mere coincidence.

Another interesting case was that of a man dying 12 hours after an operation for acute abdominal symptoms. At autopsy an *Ascaris* was observed protruding from a torn hepatic bile duct ; 7 specimens were found in the gall-bladder and 10 in the liver bile ducts.

Attention should also be called to the recording of two further cases of *sprue*, one an indigenous Creole.

Two important pieces of research were pursued : (1) On the local intermediate host of *Sch. haematobium* ; (2) On Trypanosome infection of stock.

As regards the former : Incrimination of *Bulinus* (*Pyrgophysa*) *forskali* is based on the following observations :—

" (i) *B. (P.) forskali* was the only snail of many species tested which exerted a definite attractive action on freshly-hatched miracidia.

" (ii) The miracidia were actually seen vigorously to attack specimens of this species of snail.

" (iii) Penetration was observed *in vivo* under experimental conditions.

" (iv) This was subsequently confirmed by fixation of snails after a short period of exposure to infestation, and section ; when it was seen that enormous numbers of miracidia had gained entrance into their bodies.

" (v) Developmental forms of the larval stages of the worms were readily found on dissection after about two weeks in every snail of this species exposed to infestation ; none were recovered from snails of other species.

" (vi) After a period of three weeks characteristic sporocysts were found in the liver glands, containing bifid-tailed cercariae true to type.

" (vii) Within twenty-eight days from initial exposure to infestation every snail so exposed was found on dissection to contain sporocysts with characteristic cercariae in large numbers, and at the end of this period usually a large number of cercariae were being emitted naturally from the affected molluscs.

" (viii) No other type of furcocercous cercaria has so far been found in any snails dissected at the laboratory, in spite of the fact that many hundreds have been dissected during the last ten years. 'Wild' *forshali* obtained from the canals which we utilise for our material have not so far been found naturally infested, although a specific search on a large scale for naturally-infected snails has not yet been undertaken in places where there is a greater possibility of their acquiring the infection naturally."

During the early part of the year a survey of the distribution of *Bulinus forshali* in the Plaines Wilhems was undertaken. The whole course of the river and its tributaries afforded specimens of the snail, as did small streams in the neighbourhood of Port Louis. It apparently prefers fairly swift-running streams to still water; hence, attempts to keep them alive in tanks at the laboratory were not successful. Experimental work with guineapigs has also failed; perhaps the infection presented was not sufficiently heavy.

As regards the second investigation—trypanosomiasis of stock this has been known for some time and preventive measures have included prohibition of importation of cattle from infected areas, quarantining of all imported stock for periods of observation, routine examination of the blood of cattle throughout the island, isolation and treatment of those found infected with surra and destruction of infected equines. For some years past occasional cases of trypanosomiasis have been noticed by planters among their horses and these animals survived and returned to work apparently in perfect health. These were probably cases of *T. vivax* infection, a fact borne out by the laboratory findings this year in specimens from Pamplemousses, Quatre Bornes, Candos, Highlands, Curepipe and the Mahebourg area.

Formerly, the trypanosome was believed to be *T. evansi* in each case, but some have proved to be *T. vivax*, so there are clearly two distinct infections in Mauritius—surra of Indian origin and n'gana from Africa. Of 17 cases reported 12 were infections by *T. vivax* and 5 by *T. evansi*. The main points on which the diagnosis of *T. vivax* rests are:—

" (i) The trypanosomes were recovered from several locally-bred oxen which were not very obviously ill; they had been found to be infected on casual routine examination of the peripheral blood during the work of the veterinary section of the Agricultural Department.

" (ii) These trypanosomes repeatedly and consistently failed to infect any one of a very large number of small laboratory animals, including dogs, white mice, guinea-pigs, rabbits, and monkeys (*Macacus cynomolgus*) when injected in large numbers intraperitoneally. All these animals were found to be very susceptible to infection with the local strains of *T. evansi*, which were invariably fatal to them.

" (iii) The parasites, however, were readily inoculable into cattle and goats, where the resultant infections ran a prolonged course.

" (iv) Morphologically, and in their movements when alive, they conformed to the characters of the *vivax* group of African trypanosomes.

" (v) Clinically the type of infection resulting from experimental inoculation was quite unlike that produced by similar inoculation with the local *T. evansi*. Parasites were never present in the peripheral blood of experimentally-infected animals in very large numbers; they regularly disappeared entirely, as judged by prolonged daily examinations of wet-films, for days or even weeks at a time; the animals were, seemingly,

not seriously incommoded by their infections after the first week or so following the inoculation, when there was a certain degree of irregular fever and diarrhoea; and, in the case of at least two goats and two oxen, trypanosomes became regularly more difficult to find over a period of four or five months until, finally, they have not been recovered for over three months, and the animals appear to have recovered from the infection entirely.

"(vi) Full courses of arsenical medication, repeated in some cases on two or three occasions, entirely failed to eradicate infection with this type of trypanosome, while similar courses have been efficacious in local *T. evansi* infections.

"(vii) Opportunity for the introduction of some of the less virulent African trypanosomes into Mauritius must have been fairly frequent over a period of many years, as South Africa is the usual source of pedigree and higher-grade stock for this island."

It is of fundamental importance to determine the distribution and method of spread of these infections, economically as well as scientifically, for the fact that one African trypanosome has been able to establish itself in the island in the absence of *Glossina* makes it possible that other African trypanosomes may have done the same.

During the year the following have been published by the Laboratory staff:—

- ADAMS, A. R. D. & WEBB, Lewis. (1934). A Survey of the Protozoal and Helminthic Infestation-Rates of the Male Prison and Reformatory Inmates of Beau Bassin Prison, Mauritius.—*Ann. Trop. Med. & Parasit.* Vol. 28. p. 25.
- ADAMS, A. R. D. (1934). Studies on Bilharzia in Mauritius. I. The Experimental Infection of *Bulinus (Pyrgophysa) forskali* with *Schistosoma haematobium*.—*Ibid.* Vol. 28. p. 195. H. H. S.

KENYA COLONY AND PROTECTORATE. Medical Research Laboratory Annual Report 1934 [CORMACK (R. P.), Senior Bacteriologist].—29 pp. 1935 Nairobi: Govt. Printer.

Approval has been obtained for the separation of the Government Analyst's Section from the Medical Research Laboratory to date from January 1st, 1935. The Section will, however, still be housed in the Laboratory.

Routine work of the Bacteriological and Medical Biological Sections has been transferred very largely to the care of Laboratory Assistants, and the ordinary management of the Laboratory into the hands of a Laboratory Superintendent. Owing to an epidemic of smallpox, of a virulent type, early in the year, heavy demands were made by the Medical Department for vaccine lymph. These were effectively met. The use of Dr. de Smidt's pneumococcal vaccines on mines in the Kakamega district may afford an interesting comparison with similar work in South Africa. Of the local types of pneumococci which can be recognized among Group IV strains, the three types most numerous among those reported have been the local D, L and J types, which have been found to correspond with Miss Cooper's Types VIII, V and VII respectively. Of 190 cultures of Pneumococci typed 28.4 per cent. were found to belong to Type I, 7.9 to Type II, and 9.5 per cent. to Type III. In the previous year the percentage of Type I was 17.2.

Note is made of antimalarial work carried out in eight specified areas, with special mention of the Kakamega district. The work of trapping and of otherwise reducing tsetse flies in defined areas has been continued and is affording promising results. In co-operation with the

Veterinary Research Department Staff, experiments have been initiated to investigate the possible transmission of bovine haemorrhagic septicaemia by the agency of fleas. The results of the first two experiments were suggestive of successful transmission to white mice through *Ctenocephalus felis strongylus*, Jord. Further work is planned. Particular attention has been paid to rat destruction by "Cyanogas" fumigation, to be used by native labour, in connexion with the hyper-endemic plague area of Keruguya. Tests of fumigation by "Celophite Units" of steamers and trains have led to the recommendation of their adoption, whilst preliminary trial of "Cymag" has afforded promising results with a view to a more economical fumigant for native huts.

A biochemical analysis was completed of a series of eighty-two vegetable foodstuffs, and a series of milk samples, taken at fortnightly intervals throughout lactation of three native cows, were examined among other research of the Biochemical Section. *P. H. Martin.*

PALESTINE, DEPARTMENT OF HEALTH. ANNUAL REPORT FOR THE YEAR 1934. [Section VII. Laboratory Services pp. 86-109.]

There was a further marked increase in the number of routine investigations and in the production of biological products during the year. Bacteriological routine specimens increased by 40 per cent. to 200,000; the Chemical division showed a rapid expansion of the biochemical branch; Entomological activity has been limited since the abolition in 1931 of the post of Medical Entomologist and identification of insects has been carried out by ordinary laboratory officers.

It is noted that bacteriological and chemical institutes, maintained by private funds, have greatly increased in number in the principal cities, and that such institutes have rendered considerable service.

Owing to extensive issues of vaccine lymph in 1933, increased production was called for in 1934 and this had to be unusually prolonged. A poor quality of calf made matters worse, until a new lessor provided animals which gave an average yield of 59 grams of pulp compared with the earlier average of 30.3 grams.

Antirabic vaccine, a modification of Semple's, is made in the Central Laboratories, while treatment is decentralized. Thus over 90 per cent. of bitten persons were able to attend at 31 centres within a week of being bitten. Although there has only been a negligible response to the facilities offered by way of canine prophylactic vaccination, the course of which is three doses each of 2 cc. on successive days, a very large number of ownerless dogs and cats, and wild animals were destroyed. Greatly improved legislation for control is now provided by the Rabies Ordinance of 1934.

Further investigation has been carried out in the agglutinin response to antienterica vaccination. The results, as already published, suggest that freshly prepared vaccine, without the addition of preservative, is to be preferred. The Central Laboratories, at the request of the Colonial Office, provided accommodation and gave assistance to a research worker in enterica serotherapy.

From 55 human specimens the human type of *M. tuberculosis* was isolated 9 times, and bovine not at all. Five veterinary specimens out of eight yielded the bovine type.

Diphtheria in Palestine seems in the main to run a mild clinical course; "gravis," "mitis," and one "intermediate" strains have been isolated.

Further evidence has been accumulating that arachis oil (pressed locally from imported nuts) is the chief adulterant of and substitute for indigenous oils.

In a special investigation of the causes of the high acidity (3-5 per cent.) of local unrectified olive oil, which acidity restricts its foreign market, it has been found that, by avoiding fermentation prior to pressing, local olives pressed in the laboratory can give an oil having less than 0.5 per cent. acidity. Continuation of this work, initiated by the Department of Agriculture, is planned during the next olive harvest.

The Chemical Division has also been investigating the tolerance of citrus for salinity of irrigation water. A preliminary survey in the Jaffa area points to a tolerance up to 250 parts per million, subject to good drainage, while 250 to 350 parts would be considered risky and any higher figure would indicate danger to a projected plantation. Jordan water, between the Lake of Tiberias and Jericho has shown a salinity of 300-400 parts per million, which it derives from the Lake.

Further work is also in progress at the request of the Research Department, Woolwich, on the corrosion of aluminium alloys by Palestine water.

P. H. Martin.

LHÉRISSON (Camille). **Diseases of the Peasants of Haiti.**—*Amer. Jl. Public Health.* 1935. Aug. Vol. 25. No. 8. pp. 924-929. [22 refs.]

The Public Health Service in Haiti was organized in 1919 and has had to wage an uphill fight against heavy odds. Though much remains to do, much has been accomplished, and dispensaries have been established throughout the Republic. The prevalence of disease varies in different parts of the island; clothing, mode of living, diet, geographical situation, mountain or lowland district, all exert an influence. *Trauma* is frequent among the peasants and the wounds becoming infected develop into extensive ulcers which not infrequently result in death from tetanus. The custom of children and young women carrying heavy loads leads to pelvic deformity and difficult labour, and early resumption of work on the part of the mothers entails neglect and wrong feeding of the infants resulting in high infant mortality. Diarrhoea and *dysentery* are rife, the amoebic form in the north and the bacillary fairly general, an epidemic type known as "colerin", which affects annually about 25 per cent. of the rural population, being believed to be due to *Bact. dysenteriae* Flexner.

Ascaris, hookworm (*Necator americanus*), trichuris, oxyuris, strongyloides and taenia are common; among 4,439 examined in the Carrefour, Rivière Froide and Dégand districts, 30 per cent. were infested with *Necator*, 43 with *Ascaris* and 58 per cent. with trichuris. *Neoplasms* are unexpectedly frequent. "Malignant tumours cause an approximate death rate of 5 per cent. in the hospitals of the country." *Goitre* is common in the mountain districts and pinta in the plains. *Tuberculosis* is rife and rapidly fatal; it is the most important cause of death in hospital, accounting for 30 per cent. of the total deaths.

Malaria is common; tertian and double tertian are called "acclimatization fevers." Among the 4,439 persons examined in a Rockefeller Mission survey 67 per cent. showed malaria parasites in their blood and of 11,000 going from the north and north-east to work in Cuba for the United Fruit Company 23.5 per cent. were infected. *Leprosy* is a menace and, there being no leprosarium in Haiti, the patients remain,

many of them, untreated and at large. *Yaws* is the commonest of all diseases; among 2,564 persons examined by the Rockefeller Mission in the neighbourhood of Port-au-Prince 78 per cent. were infected, and among 3,289 cases of yaws 61.1 per cent. were children under 10 years and in the Jacmel region alone in the 12 months May 1925–April 1926, 167,267 cases of this disease were treated. H. H. S.

SMITH (E. C.). **Hodgkin's Disease in Natives of Nigeria. Results of the Biological Test.**—*Lancet*. 1935. Oct. 19. pp. 874–877. With 4 figs.

This article is an account of a study of 9 cases of lymphadenoma met with in Africans in Nigeria. In three the tissues were sent without history to the author. Of the other six, 5 were males aged 10, 14, 25 and 35 years [the age of the fifth is not given], and one an adult female. Three had general enlargement, one had cervical adenoma only, another cervical and axillary, another inguinal and deep abdominal. The duration of disease, where this could be ascertained, varied from 6 months to 3 years. A gland being removed was examined for histological changes, for bacteriological associations and for Gordon's biological test in 3 cases. The histological changes were typical and are illustrated by photomicrographs. Bacterial investigations were undertaken to exclude infection with *Myco. tuberculosis* and to determine whether diphtheroid organisms, as reported by BUNTING and YATES, were present. Guineapig inoculation yielded no evidence of tuberculosis. Anaerobic cultures led to the growth of the Bunting and Yates' organism, *C. hodgkini*, together with Gram-positive cocci and Gram-negative motile bacteria. The first of these was inoculated subcutaneously or intravenously into guineapigs, rabbits and monkeys (*M. rhesus*), but with negative results (one monkey showed glandular enlargement, histologically a non-specific inflammatory reaction). In two of the three subjected to Gordon's biological test, typical-positive results were obtained and the rabbits showed well-marked paralytic symptoms from the 4th to 7th day after inoculation. In the third case the result was doubtful. [In view of the presence of this disease among natives and, it would appear, not very uncommonly, if the author was able to study 9 cases, perhaps some of those with symptoms of relapsing fever in whom the spirochaete is not found may be instances of the Pel-Ebstein form of lymphadenoma.] H. H. S.

FRANCHINI (G.). Condizioni igienico-sanitarie delle nostre Colonie dell' A.O. [**Sanitary Conditions in Italy's African Colonies.**]—*Riforma Med.* 1935. Sept. 21. Vol. 51. No. 38. pp. 1436, 1439–1440.

Very little is said in this article regarding the prevailing conditions of hygiene and sanitation in the Italian Colonies in East Africa. After a few remarks on the geography of them and on the natural waters which are not potable owing to the high saline content, the author passes on to give general advice on rendering water potable, on the questions of food, clothing, dwelling-houses, and personal hygiene and the avoidance of disease. The terminal paragraphs are occupied with a list of the diseases which may be met with; notably malaria, leprosy, ankylostomiasis, schistosomiasis, relapsing fever, yaws, and various mycotic infections. H. H. S.

LEDENTU (G.). Les maladies transmissibles observées dans les colonies françaises et territoires sous mandat pendant l'année 1933. [**Transmissible Diseases in the French Colonies and Mandated Territories in 1933.**—*Ann. de Méd. et de Pharm. Colon.* 1935. July-Aug.-Sept. Vol. 33. No. 3. pp. 552-816.

Attention is drawn to this report which cannot be abstracted. It is analogous to, though on a smaller scale, the Supplement of the *Tropical Diseases Bulletin*. Whereas in the latter the medical and sanitary reports of each of the British Colonies, Dependencies, and Protectorates is abstracted and the advances in sanitation, the prevalence of disease, measures to combat them, and research work are detailed, in the former the diseases are taken up seriatim and their prevalence in different colonies, etc., recorded. They are divided into four main groups: (1) Infections such as plague, cholera, yellow fever, smallpox and typhus; (2) Endemo-epidemic, such as malaria, trypanosomiasis, the dysenteries, relapsing fever, dengue, filariasis, yaws, beriberi, etc.; (3) Infections common to temperate and tropical climates—pneumonias, influenza, cerebrospinal fever, enteric fever, scarlet fever, diphtheria, chickenpox, mumps, rabies, etc., including also trachoma, and (4) "Social" diseases—tuberculosis, venereal diseases, leprosy, alcoholism and cancer. The whole will be useful for reference and comparison.

H. H. S.

UCHIMURA (Y.). "Imu": a Malady of the Ainu.—*Lancet*. 1935. June 1. pp. 1272-1273.

This description of "imu" would serve equally well for a description of the malady known as "latah" in Malaya.

In the condition known as "imu" the patient is liable to psychomotor attacks which are precipitated by some emotional shock, such as a sudden unexpected sound or the mention of something which is regarded with horror, such as a snake or a toad. The condition is almost entirely restricted to women who have passed middle age and who appear to be rather above the average in intelligence. Sometimes an attack consists of a sudden outburst of violence in a woman who, up to that moment, appeared quite normal; she behaves as if possessed by rage and terror, attacking everything in sight with hands, sticks, stones and weapons. The attack lasts only a few minutes and then the patient becomes normal again. In a less violent form, when the patient is startled by some word, sight or noise she "may appear suddenly bemused and will continue for a time to echo everything that is said to her. "One," you say to her and "one" the patient echoes; "you fool," and "you fool" is the answer; "bow," and she returns "bow-wow."

"Similarly, actions are copied; clapping the hands, raising the arms . . . all elicit similar acts on the part of the patient. . . . When in this bemused condition patients are highly susceptible to suggestion . . . and if placed in a given position will remain cataleptically in that exact posture until released by permission. . . . If ordered to strike a given person, that person will be relentlessly pursued until the blow has been given . . . to plunge into freezing water in the depth of winter or to bathe in boiling water offers no deterrent . . . In some patients the negative aspect of these three forms of reaction appears equally clearly. Instead of repeating what is said to them they answer with a direct opposite; instead of imitating movements they make one, the significance of which is exactly the reverse; instead of obeying suggestions they act in a directly contrary

manner. . . . Similar maladies are to be found amongst the natives of Malay, the Yakuts of Siberia, and the American Indians, other races whose cultural level is recognized as being lower than that of the average."

The spiritual life of the Ainu people is very primitive and, as with all such races, their degree of suggestibility is high. The women are by custom completely submissive to the men. The author regards both hysteria and imu as being due to repressed resentment, and the resentment which activates the imu patient as being occasioned by the subordinate place to which she is relegated by Ainu tradition. The word "imu" means "severe shock." The condition itself is generally called "imu-futchi" or "imu-bakko," each of these suffixes meaning "old woman." Sometimes it is called "tokoni-bakko," "tokoni" being the native name of a dreaded viper, the mere mention of whose name brings on an attack.

W. Fletcher.

BROWN (Arthur A. Forbes). **The Ulcer Syndrome in Tropical Africa.**—*Jl. Trop. Med. & Hyg.* 1935. Vol. 38. July 1, 15, Aug. 1, 15 & Sept. 2. pp. 157-161; 170-176; 187-193; 201-206; 215-220. [43 refs.]

This is a very good article, clearly the outcome of much careful study. The author allocates ulcers to three main groups, but the grouping is on an arbitrary plan [or want of plan] for the grouping is not a classification. Group A includes ulcers resulting from trauma, scabies, etc., and spirochaetal such as yaws. Group B is the phagedaenic [spelt phagoedenic throughout the article]; Group C comprises ulcers clinically identical with Group B but resulting from trauma and later becoming phagedaenic. This, it will be seen, is not a grouping, since any ulcer may become phagedaenic.

The bacteriological aspect is dealt with and analyses made of over 400 cases. Almost 9 out of 10 of the ulcers with *B. fusiformis* are phagedaenic whether associated with spirilla or not. The question of sex and tribal incidence is next discussed and then the coexistence of parasitic affections, malarial, or helminthic. Treatment is considered in some detail and results of careful blood analyses as regards serum Ca and P are tabulated. About one-third of those with phagedaenic ulcers have a low Ca level and the beneficial effect of administration of calcium and parathyroid is noted. Diet is a subject which cannot be ignored in connexion with the aetiology of ulcers in tropical countries and due prominence is given to it here, more than half the article being devoted to this side of the subject. The following are the author's conclusions:—

"(1) The exact relationship of *Bacillus fusiformis* and *Spironema* to *ulcus tropicum* remains unproved, but the evidence suggests that these organisms are causal.

"(3) Ulcer is a class disease, and is not found among the better classes or in institutions.

"(4) Ulcer seems to be closely related to calcium and/or parathyroid deficiency, and may be a manifestation of latent tetany.

"(5) The calcium deficiency does not appear to be in the diet, but seems to be due to the diet, faulty absorption probably being a factor.

"(6) The exact connection of the parathyroid with the condition is not clear, but the gland appears to have factors controlling calcium regulation and skin vitality and resistance, and it may be affected by dietary deficiency.

"(7) One of the most important considerations is the quality of the protein in the diet. Ulcers are much more common in vegetarians than in those who include animal substance in their diet. It is essential that a fair proportion of the protein should be of animal origin, as even nuts and beans have the disadvantage of being covered with resistant fibre.

"(8) The vegetarian diet, as consumed by the African native, is much too bulky. Digestion of protein, fat and calcium may be greatly interfered with. The most important prophylactic measure, which would go far to prevent the appearance of the ulcer syndrome, is to include meat, eggs, fish, or fowl in the diet, and to reduce the amount of vegetable matter; the consumption of three smaller meals instead of two larger, would favour optimal utilization."

This article would form an excellent basis for a monograph on the nature, causation, pathology and treatment of ulcers in the tropics [not a "syndrome," which means a set of concurrent symptoms in disease.]

H. H. S.

FAIRLEY (N. Hamilton) & MACKIE (F. P.). **Case of Streptothrical Ulceration of the Colon with Portal and Systemic Pyaemia.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. July 31. Vol. 29. No. 2. pp. 151–156. With 3 figs. on 1 plate & 1 chart.

This is an account of a case of actinomycosis in a man of 60 who had returned to England, after a long residence in China, about two months before the onset of his illness.

The disease apparently originated in the "colon" but became generalized and ended fatally after 94 days. The clinical features suggested "liver abscess," but an exploratory operation failed to reveal any pus. About six weeks after this operation an abscess appeared in the left forearm, and from the pus of this a "streptothrix" was cultivated. Five days later a superficial abscess on the right leg was opened and the pus from this also yielded a "streptothrix." Three days later the patient died.

The macroscopic and microscopic appearances of the tissues, post-mortem, are described and a brief account is given of the fungus which was feebly Gram-positive, not acid-fast and presented the general morphological characters of *Actinomyces*. It grew aerobically, did not liquefy gelatine and caused "no change in lactose, glucose, mannite, dulcitol, sucrose, maltose, raffinose, galactose." Rabbits, guinea-pigs and white mice inoculated by the subcutaneous, intraperitoneal or intravenous routes remained healthy and the fungus was not recovered from their viscera. The *Actinomyces* is thought to belong to Group I of Ørskov's classification.

J. T. Duncan.

NIÑO (Flavio L.). **Blastomycosis humana generalizada por *Cryptococcus* (n. sp.).** (Estudio clínico, parasitológico, anatomopatológico y experimental. [**Generalized Human Blastomycosis caused by a New Species of *Cryptococcus*.**])—*Universidad Buenos Aires: Misión de Estudios de Patología Regional Argentina Jujuy.* 1934. Monografía No. 3. 164 pp. With 129 figs., 13 plates & 7 charts. [110 refs.]

This could probably claim to be one of the most detailed records of a single case in the literature. The monograph gives an account of the clinical state of a man of 60 years who died from an infection with *cryptococcus*, and of the investigations connected therewith. The

patient had suffered for 14 years with an ulcerated condition of the face with scab-formation. About a month before death similar lesions developed on the back. He had shown evidence of urinary disturbance; abscess of the prostate and blastomycotic involvement also of the renal pelvis were found to account for this; dyspepsia was present due to gastritis of blastomycotic origin it was supposed, and, latterly, meningeal symptoms, and, post-mortem, oedematous infiltration of the pia was found, and in the right cerebral hemisphere, deep down near the lenticular nucleus, a softened mass the size of a 5 centavo piece. The lungs were also involved; there was pus in the bronchioles of the right lung and a cavity in the left.

The author describes the fungus isolated from the lesions and experimental work carried out with cultures of it. It proved to be a Blastomycete of the genus *Cryptococcus*, but of a species not previously described and the author has named it *C. psychrophylicus* "on account of its most striking biological characteristic of growing at low temperatures only." (*ψυχρός*=cold). Growth was best at 22–25°C., was good at 10°C., but arrested at 37°C. Guinea-pigs, white rats and mice were very susceptible to experimental inoculation and presented lesions similar to those in the human case; the dog and rabbit were less susceptible, while the monkey, cat and pigeon were refractory. In susceptible animals the course of disease was slow but invariably led to death. Histologically, there were produced granulomata with abundant giant-cell formation and at the same time histolysis with necrosis and abscess. Dissemination occurred probably by the blood stream. The value of the work is much enhanced by the large number (129) photographs and photomicrographs depicting the histological changes set up and by 13 beautifully reproduced coloured plates. H. H. S.

MACKINNON (J. E.). Estudio del primer caso uruguayo de cromoblastomycosis y 'revista critica' sobre la enfermedad. [**A Study of the First Uruguayan Case of Chromoblastomycosis and a 'Critical Review' of the Disease.**]—*Arch. Urug. Med.* 1934. Vol. 2. pp. 201–226. With 8 figs. [Summarized in *Rev. Applied Mycology*. 1935. Aug. Vol. 14. Pt. 8. p. 509.]

"Clinical, morphological, and cultural details are given of the first Uruguayan case of chromoblastomycosis due to *Phialophora verrucosa* in a white native of the country. The lesions on the patient's right hand resembled those of sporotrichosis from a histopathological point of view. The disorder described by Montpellier and Catanei from North Africa as due to *Hormodendron algeriensis* is considered to be a form of chromoblastomycosis, which may also be induced by *Trichosporium pedrosi*. So far the known distribution of chromoblastomycosis is as follows: twenty-one cases in Brazil and one each in Paraguay and Porto Rico (*T. pedrosi*), two in the United States and the present one in Uruguay (*P. verrucosa*), and one in North Africa (*H. algeriensis*). The disease has further been reported from Costa Rica, Russia, and East Africa (one case each) but without any definite attribution."

CARRIÓN (A. L.) & EMMONS (C. W.). **A Spore Form Common to Three Etiologic Agents of Chromoblastomycosis.**—*Puerto Rico Jl. Public Health & Trop. Med.* 1935. Sept. Vol. 11. No. 1. pp. 114–115. [Spanish version pp. 116–117.]

Three fungi giving characteristically different growths on culture are known to cause blastomycosis, viz., *Phialophora verrucosa* whose

"small egg-shaped spores are budded out successively in the cup-like mouth of a flask-shaped conidiophore"; *Hormodendrum pedrosoi* with larger oval spores "in branching conidial chains on simple or branched conidiophores," and *H. compactum* with "subspherical spores, separated by wide septa . . . borne in branching conidial chains on simple or branched conidiophores."

In the tissues, however, these differences are not distinguishable and on account of this fact a close interrelationship has been suspected. The authors have recently examined 6 strains of the second of those mentioned (*H. pedrosoi*), 4 Porto Rican and 2 South American, and one strain of *H. compactum* and found spores of the *Phialophora* type, though in smaller numbers than the characteristic forms. The discovery of a spore form common to all three affords further evidence of the hitherto suspected relationship. A paper with more detail is to be published.
H. H. S.

MARTIN (Donald S.). **Complement-Fixation in Blastomycosis.**—*Jl. Infect. Dis.* 1935. Nov.-Dec. Vol. 57. No. 3. pp. 291-295.

The antigen used for the C.F. test was a suspension in salt solution of the organisms grown at 37°C. on beef-infusion pH 7.4 blood-agar slants. The patient's serum was inactivated at 56°C. for 15 minutes and the test carried out as for the W.R. Five strains of Blastomycetes isolated from the same number of patients were used. In three patients with generalized infection the test was positive, in one negative. Sera from 78 others put up as controls were all negative and two of the sera positive for Blastomycetes were negative for *Sporotrichum*, *Monilia*, *Coccidioides*, *Mycoderma* and *Histoplasma*. No correlation was observed between the presence of complement-fixing antibodies and the patient's clinical state. It is concluded that the test is of great positive value, "a positive . . . with a 1-4 dilution of the patient's serum is diagnostic", but a negative test does not exclude infection with Blastomycetes.
H. H. S.

KITABATAKE (E.) & LIU (K. P.). **A Case of Pneumonomycosis aspergillina.**—*Jl. Oriental Med.* 1935. Vol. 22. No. 3. [In Japanese pp. 497-505. With 1 plate. English summary p. 43.] [Summarized in *Rev. Applied Mycology*. 1935. Aug. Vol. 14. Pt. 8. p. 510.]

"An undetermined species of *Aspergillus* was found to be responsible for necrosis of the lung parenchyma in a 23-year old male native of Manchukuo, this being apparently the first record of pneumomycosis in the region under observation or in Japan."

CASTELLANI (Aldo) & STANDRING (Thomas). **A Case of Bronchomycosis due to *Mompha tropicalis*.**—*Jl. Trop. Med. & Hyg.* 1935. Oct. 1. Vol. 38. No. 19. pp. 244-245.

MARQUE (E.) & RAYNAL (J.). **Mélioïdose à forme septicémique suraigüe. [Hyperacute Septicaemic Mellioidosis.]**—*Bull. Soc. Méd.-Chirurg. Indochine.* 1935. Nov. Vol. 13. No. 9. pp. 1259-1263.

A remarkable and unusual case. A woman of 48 years was taking her two daughters, who were suffering from typhoid fever, in a motor car to

hospital. An accident occurred and the car was thrown down an embankment into a pond. The woman was rescued after submersion "for a certain time" and taken to hospital [the fate of the daughters is not mentioned]. There she was found to have contused wounds of both legs, bruises of the chest and signs of water in the lungs. The pulse was barely perceptible and she was expectorating blood and blood-stained froth. Next day she lay in a state of coma-vigil, but though there was some respiratory difficulty, there was no further haemoptysis. Dulness was present at the base and some moist râles. The day after she regained consciousness and seemed much better, but within 24 hours the temperature rose to 39.9°C., the lung signs were better in the right, aggravated in the left, and there was headache and rapid pulse (135 per minute). Thirty-six hours later the temperature was 40.7°C., pulse 140, and there was insomnia with continuous delirium. Next day the general condition was worse; temperature rose further, the pulse became uncountable; a sample of blood was taken for culture and sent to the Pasteur Institute and death occurred 8 days after admission to hospital. Autopsy was not performed, but report came from the laboratory that *Pf. whitmori* had been identified from the culture.

The important question was the source of infection. One possibility was the patient was already infected before the accident occurred and that the immersion and pulmonary complication had precipitated the illness (but except for high arterial tension and some deafness from otosclerosis she was in good health prior to the accident). The other possibility was that the immersion and swallowing of water polluted by rats had been the cause; rats have been incriminated as a reservoir of this organism.

H. H. S.

VAUCÉL (M.) & HASLE (G.). Un cas de septicémie à bacille de Whitmore. [*Septicaemia due to *Pf. whitmori*.*—*Bull. Soc. Méd.-Chirurg. Indochine*. 1935. Nov. Vol. 13. No. 9. pp. 1256-1258.

A soldier of the Tonking tirailleurs was admitted to hospital complaining of headache and generalized pain and giving a history of a week's fever. His face was congested and breathing dyspnoeic, and there were disseminated rhonchi and basal râles; the liver was slightly enlarged but not painful. Six days later jaundice was observed, the fever remained about 40°C. and a blood culture was attempted. Widal and Weil-Felix reactions with serum were negative. Death occurred a week after admission. The haemoculture gave a growth of *Pf. whitmori*, confirmed by animal inoculation. At autopsy, the chief lesions were an abscess as large as a pigeon's egg at the lower pole of the right kidney and small miliary abscesses in a corresponding situation of the left; the spleen and liver were congested and a little enlarged. Apart from congestion and "small superficial iridescent patches" in the left lung, these viscera showed little. The source whence the infection was contracted was not discovered.

H. H. S.

BEZEMER (F.). Melioidosis op Celebes. [*Melioidosis in Celebes.*—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1935. Sept. 3. Vol. 75. No. 18. pp. 1577-1579. English summary (2 lines).

A Mandarese (Celebes) woman of 25 years came under the care of the author. She was suffering from a fistulous abscess of the right

buttock. From the pus *Pf. whitmori* was grown and intraperitoneal inoculation into guineapigs caused death and from the organs the bacterium was again recovered.

This is said to be the fourth case recorded in the Dutch East Indies [see this *Bulletin*, 1934, Vol. 31, p. 344]. H. H. S.

- i. CASTELLANI (Aldo). **A Note on a Peculiar Febrile Hepato-Splenomegaly with Arthritis.**—*Jl. Trop. Med. & Hyg.* 1935. Sept. 16. Vol. 38. No. 18. pp. 229-230. With 1 chart.
- ii. —. **The Diagnosis of Hepato-Splenomegalies.**—*Ibid.* pp. 230-232.

i. The disease described is characterized by gradual onset of malaise and joint pains with asthenia. The temperature is raised, of an irregularly intermittent or remittent type or with a chart resembling that of undulant fever; rigors are not usual. The spleen and liver are both hard and enlarged, extending even to the level of the umbilicus; [which is the first to enlarge is not stated; perhaps cases have not been seen early enough for this to be determined]. There is no jaundice. One or more joints, large or small, are swollen and painful but not as a rule reddened. There are no special blood changes, no enlargement of lymph nodes. Though there may be periods of amelioration the course is progressive; one patient died after an illness of 14 months.

The causation is at present unknown, investigations so far have yielded entirely negative results; Wassermann and Widal tests against the enterica and *Brucella* groups all negative. No treatment appears to affect the course of the disease.

The author has seen three cases; perhaps more will be met with now that attention has been drawn to it, for its distribution, if sparse, is widespread; two were seen in South Europe and one in America.

ii. This article mentions the various conditions in which great enlargement of liver and spleen occur. They are divided into two main groups, those with fever (20 in number) and those without (17 more) and the chief characteristic points of each are briefly referred to.

H. H. S.

- i. MANUWA (S. L. A.). **Notes on Some Cases of Interest.**—*West African Med. Jl.* 1935. Jan. Vol. 8. No. 3. pp. 15-17. With 7 figs. on 4 plates.
- ii. —. **Lymphostatic Verrucosis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. Nov. 25. Vol. 29. No. 3. pp. 289-290. With 2 figs. on 1 plate.

Of the four cases recorded in (i), attention may be directed to two as of particular interest. One was a case of Lymphostatic verrucosis, a condition bearing superficial resemblance to Mossy Foot, the description of which is enhanced by two excellent illustrations [see also this *Bulletin*, 1935, Vol. 32, p. 182]. This case is also described in (ii). The other was a case of Porocephalosis. Human infection with *Porocephalus* is not so uncommon as the author states, but its pathogenicity has been doubted. The subject in this instance was an Ibo male, about 30 years old, who was suddenly attacked with vomiting, abdominal pain and distension. He died four hours later and the acuteness of the symptoms and the rapidly fatal issue were somewhat naturally ascribed to poisoning of some kind. At autopsy some 20 or more nymphs of

Porocephalus were found in the radicles of the hepatic vein, others were attached to the mesentery. *Schistosoma haematobium* was present in the bladder; the spleen was fibrotic. Snake-eating is common in the district.
H. H. S.

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS. 1935. Nov. Vol. 65. No. 5. Facing p. 324. **The Haemorrhagic Syndromes.**

This is an editorial giving in the form of a table the distinctive points of the morbid conditions associated with haemorrhage. Many practitioners, in fact we may confess without shame that at some time or other, even late in our medical career, we all have found difficulty in distinguishing purpura simplex, from Schönlein's or Henoch's purpura or from the numerous symptomatic purpuras. In this table, they are divided into two main groups of primary diatheses and secondary or symptomatic purpuras; the former again subdivided into haemorrhagic (purpura simplex and essential thrombopenia or Werlhof's disease), allergic (Schönlein's and Henoch's types of purpura) and "haemophilic" (haemophilia and haemogenia) and under each the particulars are given as regards characters of exudate, the cells of the blood, the coagulation time and bleeding time, the age and sex of patients, the treatment and prognosis. In truth, a very present help in time of trouble.
H. H. S.

MACIAS Y MACIAS (Francisco). Otro caso de otomiasis por "*Wohlfahrtia magnifica*" (Schiner, 1862). [*Otomylasis due to Wohlfahrtia magnifica.*]*—Medicina Paisés Cálidos.* Madrid. 1935. Nov. Vol. 8. No. 11. pp. 538-541. [11 refs.] French summary (4 lines).

W. magnifica usually deposits its larvae in decomposing animal matter, but not infrequently on ulcers and infected wounds and in the natural orifices of man and animals—in man the nose, ear and mouth and on the eyes. The diptera lives in the open and hardly ever enters dwellings. The case here recorded is that of a backward child of five years, with a discharge from one ear. There had been a little pain in the ear, but this became suddenly intensified and prevented all sleep. Examination discovered larvae (three were extracted) which proved to be those of *W. magnifica*.
H. H. S.

ALLAN (Joyce). **Poisonous Shellfish.**—*Med. Jl. Australia.* 1935. Oct. 19. 22nd Year. Vol. 2. No. 16. pp. 554-555. With 6 figs.

The subject of this interesting paper is poisoning resulting from the bite of certain shellfish. The text of the discourse is a case which was reported from Queensland, the patient being bitten at Hayman Island and dying before reaching hospital on the mainland. Such cases are not uncommon in the South Pacific Islands, in New Guinea, New Hebrides, New Caledonia, Tonga, Samoa, Fiji, New Britain, the Carolines, the Society, Sandwich, and Loyalty Islands. The shellfish are *Conus* species, with brightly coloured shells. Five at least are known: *Conus tulipa*, *C. marmoreus*, *C. geographus*, *C. textile* [*? textiles*] and *C. aulicus*.

The fish have a long tubular proboscis which can be protruded beyond the shell and opening into it is a sac containing two rows of hollow teeth. These penetrate the hand, for example, and the poison which is at the base of the teeth is injected into the bite. The symptoms after the initial prick are acute pain, swelling, local numbness and spreading paralysis. Speech becomes thick and indistinct, the sight is dim and a sensation of "pins and needles" extends all over the body. "Sore eyes" is a troublesome symptom and may be the last to clear. There may be early drowsiness deepening to coma and death.

The natives know of the danger of these bites and make small incisions round the site to cause free blood flow. H. H. S.

TALUKDER (M.). A Case of Aconite Poisoning treated by Hypertonic Saline by the Intravenous Route.—*Indian Med. Gaz.* 1935. Nov. Vol. 70. No. 11. p. 628.

Poisoning by aconite is not uncommon in India and this case is recorded because of the recovery which followed an unusual form of treatment after all the usual methods had failed and the patient appeared to be *in extremis*.

The patient by mistake swallowed about an ounce of A B C liniment (aconite, belladonna and chloroform; and lin. aconiti contains 0.2 per cent. alkaloid). The stomach was washed out with solution of potassium permanganate as soon as possible, but all the symptoms of poisoning by aconite appeared and were so severe as to mask those of belladonna or chloroform. In spite of a second lavage, the pulse became increasingly rapid, weaker and irregular, there was marked collapse with restlessness, profuse perspiration and frequent diarrhoea. Although camphor, ether, strychnine, digitalin and other stimulants and restoratives were given the patient's condition was becoming rapidly worse; respiration failed on four occasions and was restored only by artificial means. Dr. Talukder, on account of the dehydration resulting from the sweating and diarrhoea, thought intravenous administration of hypertonic saline might be worth a trial. Three pints [strength not stated] were given and improvement was surprisingly rapid. All the symptoms abated and recovery was complete in 72 hours.

H. H. S.

McGEORGE (Murray). Haematological Variations in Fifty Normal Adult Males.—*Jl. Path. & Bact.* 1936. Jan. Vol. 42. No. 1. pp. 67-73. With 4 charts. [16 refs.]

In recent months there has been considerable impulse in haematological investigations. Whereas much work has been done for many years on the blood changes in disease, attempts are now being made to establish the limits of the normal in different parts of the world, in different sexes at different ages and of persons engaged in various occupations [*ante*, pp. 75-9].

The author has set out to determine the absolute figures for corpuscular volume, haemoglobin and corpuscular haemoglobin concentration in 50 London medical students all believed to be in normal health. Blood was taken by venepuncture, and 5 cc. placed at once in a small test-tube containing 4 mgm. of potassium oxalate and 6 mgm. of ammonium oxalate, both in solid form, for in this concentration cell shrinkage does not occur on centrifugation. Haemoglobin was

estimated by Haldane's method, 13.8 gm. corresponding to 100 per cent., and the tube in use was checked by Van Slyke determinations. Sedimentation rate and mean corpuscular volume were determined by the Wintrobe tube method.

American figures for the haemoglobin have generally been found a little higher than those recorded by investigators in England. The author gives his own findings and those of other authorities—PRICE-JONES, OSGOOD, HASKINS, TROTMAN, VAUGHAN, GODDARD, WHITBY and HYNES, JENKINS and DON—for comparison. For these the original must be consulted. In the author's cases, the average red cell count ranged between 4.85 and 6.37 million per cmm. with an average of 5.48. The haemoglobin average was 110 per cent. Haldane or 15.2 gm., the limits being 94 per cent. (13.0 gm. and 125 per cent. (17.4 gm.)). The mean corpuscular volume (obtained by dividing the volume of packed red cells in cc. per 1,000 cc. blood by the number of cells in millions per cmm.) was 84.6 (limits 78.3 and 90.0); the mean corpuscular haemoglobin (average Hb content per cell expressed in micromicrograms, and $= \frac{\text{Hb. in gm. per 1,000 cc. blood}}{\text{Red cells in millions per cmm.}}$) was 27.8 (limits 24.5 and 29.5), and the mean corpuscular haemoglobin concentration $= \frac{(\text{Hb. in gm. per 100 cc. blood})}{\text{Vol. of packed cells per 100 cc. blood}}$ was 33.0 (limits 30.0 and 35.1). The sedimentation rate ranged between 1 and 7 mm. (Wintrobe's tube) with an average of 3.8. Much higher readings even up to 16 were obtained if the tubes were not placed to stand absolutely perpendicularly. The individual findings are detailed in tabular form in a useful appendix, and the author concludes that his studies "indicate the wide variations in these figures which are compatible with health. In the application of haematological standards to clinical medicine, therefore, it is the normal range rather than the average figure which is of practical importance." [This is a matter often forgotten when figures for a single case are recorded in disease and departures from the average are regarded as abnormal.] H. H. S.

HOLIDAY (Ensor Roslyn), KERRIDGE (Phyllis M. Tookey) & SMITH (Frank Campbell). **Amount of Haemoglobin in the Blood.**—*Lancet*. 1935. Sept. 21. pp. 661–665. With 2 figs. [40 refs.]

The authors point out that the amount of haemoglobin in a given volume of blood cannot at present be accurately estimated, and that the percentage of haemoglobin relative to a "normal" standard is accurate only for the apparatus employed and differs widely with different instruments. In this paper the haemoglobinometers at present in use are critically surveyed. It is pointed out that the most satisfactory standard would be afforded by known concentrations of pure haemoglobin, but as this is not yet practical recourse has to be made to certain chemical and physical constants of haemoglobin. Iron content and extinction coefficient at the head of one of the absorption bands of haemoglobin are the most reliable and easily determined constants of haemoglobin. The latter was used in calibrating the photo-electric haemoglobinometer described in this paper. The normal value, which corresponds with 105.5 per cent. on the Haldane scale, was translated into terms of extinction coefficient by parallel determinations with a photo-electric haemoglobinometer and a Hilger

quart spectograph with "Spekka" photometer on the blood of forty-two subjects whose blood varied in haemoglobin concentration from 20 to 120 per cent. of the normal value.

For details of the apparatus and method the original paper should be consulted.

N. Hamilton Fairley.

HARVEY (W. F.) & HAMILTON (T. D.). **Studies in Method and Standardisation of Blood Examination. II. Sedimentation Rate and Sedimentation Volume of Blood.**—*Edinburgh Med. Jl.* 1936. Jan. Vol. 43. No. 1. pp. 29-46. With 8 figs. (3 on 1 plate) & 2 graphs. [18 refs.]

In this paper the authors describe a capillary tube technique for determining the sedimentation rate and sedimentation volume of blood which is stated to be both dependable and easy to carry out and repeat. A capillary method had already been described by M'Sweeney, but, as the authors point out, the present technique differs in certain details.

N. Hamilton Fairley.

DHAR (Jyoti). **Haematological Studies in Indian Women. (Part Four). A Preliminary Report on the Determination of the Schilling Haemogram (Differential Leucocyte Count) in Eighty-Six Normal Bengali Women.**—*Calcutta Med. Jl.* 1935. Dec. Vol. 30. No. 6. pp. 333-366. With 5 figs. [50 refs.]

Dr. Dhar has continued his haematological studies and the present gives an analysis of the results of examining the leucocyte formula of 86 normal Bengali women. He discusses Arneth's classification and is fully cognizant of the difficulties due to personal differences in interpretation of what constitutes separate lobes of the nucleus. He therefore considers the modifications of PAPPENHEIM and of COOKE and PONDER, the "weighted mean" of the latter authors, the index of BUSHNELL and TREUHOLOZ, and that of HEUSON. He then defines the characters of the various white cells in order that there may be no confusion regarding his meaning and records his findings, in accordance with the haemogram of SCHILLING. The women were between 16 and 35 years and, so far as was known, healthy. Of course 86 is a very small number on which to base standards, but the figures obtained form a guide for more extensive researches. He found the following averages in percentages, the range is given in brackets after each: Basophile 0.1 (1-2); eosinophile 3.2 (1-12); myelocyte 0.01 (only one was seen in all); juvenile forms were absent in 21 of the subjects, the average was 1.4 (1-4); "staff" forms 9.8 (2-18); segment 53.5 (40-73); lymphocytes 30.3 (17-42), and large mononuclears 1.5 (1-6).

H. H. S.

JUSTER (Irving R.). **The Normal Range of the Leucocyte Count determined weekly over an Extended Period.**—*Jl. Lab. & Clin. Med.* 1936. Jan. Vol. 21. No. 4. pp. 376-380. With 3 charts.

Before starting an investigation into the leucocytic changes, qualitatively and quantitatively, occurring in disease, the author wisely undertook a study of 11 persons, believed to be in normal health, making a total leucocyte count weekly, on the same day and at the same hour. Their ages ranged between 17 and 50 years, 7 were women,

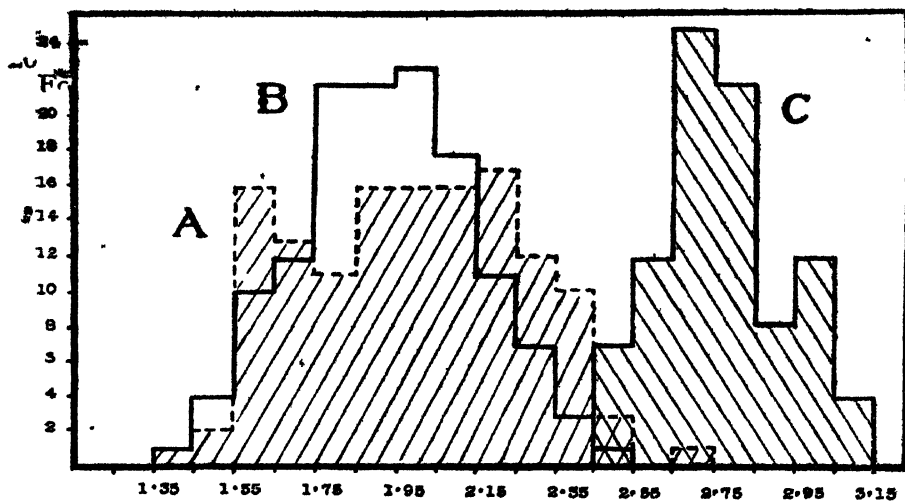
4 were men. The lowest number of counts made in any one individual was 11, the highest 85. Nine were fairly closely similar (see table) and are therefore regarded as normal; two differed from the others and were designated abnormal, although nothing was detected physically to account for the difference. They were considered to be "in a more emotional state than the others," and psychological conditions have been shown to be accompanied by a leucocytosis. The average normal range was seen to be considerable, from 4,000 to 9,000, an increase over 100 per cent. from the lowest to the highest. Neither season, sex, nor age appeared to exert any material influence on the total count.

	Case	Lowest	Highest	Average
Normal	1	4,700	10,700	7,300
	2	4,200	10,600	7,100
	3	4,000	9,300	6,700
	4	3,700	10,000	6,900
	5	4,300	10,700	7,100
	6	4,300	9,600	6,600
	7	4,000	8,300	5,800
	8	6,200	8,600	7,300
	9	4,800	7,500	6,100
Abnormal	10	5,300	12,600	8,100
	11	6,400	12,900	9,100

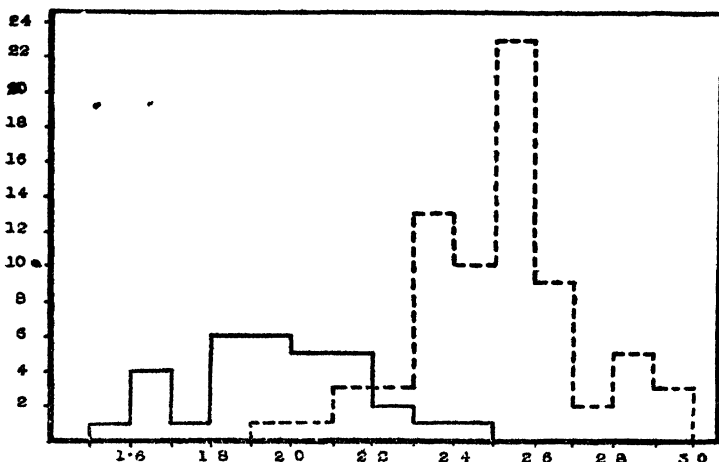
H. H. S.

KENNEDY (Walter P.) & MACKAY (Ian). **Further Studies on the Polynuclear Count in Iraq.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. Nov. 25. Vol. 29. No. 3. pp. 291-298. With 4 figs. [11 refs.]

In a previous paper Kennedy demonstrated a marked shift to the left in the Arneth count of natives of Iraq [see this *Bulletin*, 1935, Vol. 2, p. 528]. With a view to testing whether this was the effect of or was influenced by infection or race, the authors made further investigations on 134 healthy British airmen and officers stationed near Baghdad. None had been there for less than 6 months. They also made similar observations on the blood of 32 rabbits, determined healthy by autopsy. They found that the "weighted mean" of the polynuclear count was a better standard than the Arneth index. The weighted mean "is found by multiplying the total cells in each class by the number of the class, summing the results, and dividing by the number of cells counted." For the Iraqi this was 1.99, for the airmen 1.94. The accompanying graphs demonstrate clearly the definite move to the left both in human beings and in rabbits as compared with figures in Britain and also that there is no marked difference between the British airmen in Iraq and the natives. No explanation is given but it is suggested that "Climatic conditions appear to be a likely determinant, the ultra-violet radiation and heat are probably important factors." Records from other countries on these lines would be of great interest, not only for comparison but also as a help towards elucidating the reason.



Frequency polygons of weighted means of polynuclear counts: A, British airmen, B, Iraqi nationals, C, Cook & Ponder's health standard group



Frequency polygons for weighted means of polynuclear counts for rabbits in Iraq, whole line, and in Britain, dotted line

[Reproduced from the *Transactions of the Royal Society of Tropical Medicine and Hygiene*]

H. H. S.

INCLAN (Clemente) & SANTAMARINA (Victor). Estudio de la sangre del niño recién nacido normal. [Study of the Blood of the Normal Newborn Infant.]-*Archivos Med. Infantil* 1935. July-Aug - Sept. Vol. 4. No. 3. pp 125-167. With 37 graphs & 10 figs.

There has been in recent months a considerable activity in reporting the results of blood examinations. Attempts have been made to establish normal standards of the constituents for persons of different

racers or living in different localities [*ante*, pp. 75-9] but the majority of these examinations have been made on adults, a few on children, but none, so far as the reviewer is aware, on the newly born. [The results of blood examination in young children are by no means infrequently misinterpreted because the medical man regards what may be closely approximating the normal in a child as a grave departure from what he has come to recognize as the normal (for adults). True it is a departure, but is not of the significance that a similar difference would be in the case of an adult.] The value of this investigation is therefore great, for examinations were undertaken practically from birth and repeated during the early days of life and took account of the red corpuscles, their numbers and characters, the haemoglobin [unfortunately stated as percentage only], the leucocytes, the Arneth count, and the coagulation time. A few words are called for on each of these; for further details the original article, which is embellished by many graphs and several photomicrographs, must be consulted.

An introductory section gives some general remarks to the effect that at birth the blood and lymphocyte factories are in process of development and that irregularities in the blood picture are to be expected; young forms of cells are more common, myelocytes and even promyelocytes are by no means rare, immature red cells are equally common, all evidence of hyperactivity of the blood factories.

Among the erythrocytes anisocytosis is readily observable [there is a good illustration of this] and the smaller forms are particularly common in the early days of life. Polychromatophilia is constantly present, and very marked in the first 2-3 days; normoblasts are present up to as many as 8 per cent. and even 18 per cent. has been seen. Megaloblasts have been reported by others, but the authors very rarely found them. They determined that there was a very definite erythrocyte curve or more strictly a definite variation from day to day. At first a polyglobuly, purely physiological, with a total of over 6 million, falling in 24 hours or so to a little over 4 million, and rapidly rising again to six and by the fifth day about 5-5½. The haemoglobin also varies, oscillating between 100 and 130 per cent., sometimes remaining high to the 7-9th day (when examinations ended), at other times falling to 80-90 per cent. [This statement loses much in that the mode of estimation is not stated, and these, as is well known, vary greatly in accuracy; estimation in grams per cent. would be far safer and convey more information.]

The leucocyte total also is variable. It is high at birth; it was found to vary on the first day between 18,000 and 36,000 per cmm., but fell rapidly by the third day to between 8,500 and 14,000 and kept between these limits till the end of examination (8th-9th day). The relative counts showed interesting variations. At birth the polymorphonuclears usually preponderated enormously, 92-94 per cent., lymphocytes 7-4 per cent.; within a day or two the former fell to 65-85 per cent. and the latter rose to 15 or even 25 per cent., and at the 8th or 9th day the lymphocytes usually exceeded the neutrophils, and by the 12th day they might be equal. Eosinophiles were more frequent than large mononuclears; the two together varied between 0 and 10 per cent.; on rare occasions eosinophiles were as high as 12 and even 15 per cent.; it was very exceptional for monocytes to be as numerous as this. The authors saw no basophile cells. Young forms of neutrophils were seen in a proportion of 4-10 per cent., myelocytes about the same, and *stabkernige* from 10-35 per cent. Owing to the large proportion

of young forms of neutrophils the Arneth count showed a definite shift to the left. There appeared to be no constant relation between the numbers of large and small lymphocytes. Lastly, the coagulation time. In the newborn this was very rapid, oscillating between $\frac{1}{4}$ and $\frac{3}{4}$ minute in the great majority of cases; a few showed a clotting time as long as one minute.

[This article has been dealt with fully because, although the findings confirm in many particulars those recorded for European children at home, such details have not been worked out in native infants.]

H. H. S.

OSGOOD (Edwin. E.). **Normal Hematologic Standards.**—*Arch. Intern. Med.* 1935. Nov. Vol. 56. No. 5. pp. 849-863. With 6 charts. [14 refs.]

This study with a view to establishing the normal blood standards is worthy of the highest praise. By examining in detail the blood from a large number of persons, living in or near Portland, Oregon, all apparently healthy and native born, the author has determined as accurately as he could the normal erythrocyte and leucocyte totals, haemoglobin values in percentage and, what is of much greater value, in grams, the cell volumes, reticulocyte counts, differential leucocyte counts, sedimentation rates and so forth, for both males and females, children from 4 years of age to adults of 30 years or more. He has thus established the local standards and his table will be of great use for comparison elsewhere. The details and choice of methods are given in the original, to which reference can be made, but most if not all of them will be found in good modern text-books on haematology.

In order that others may have the standard for comparison, Dr. Osgood's table is reproduced. In only one investigation, that of reticulocyte percentage, were there less than 500 persons examined.

Hematologic Values obtained for Healthy Subjects in the Present and Similar Series

	No of Sub- jects	Age, Years	Sex	Average Values		Range of Values
				Clinical	Actual	
Erythrocyte count millions	215	4-13	M & F	5.0	(5.04)	4.2-5.8
	259	14-30+	M	5.4	(5.42)	4.6-6.2
	152	14-30+	F	4.8	(4.83)	4.2-5.4
Hemoglobin, percentage	215	4-13	M & F	85	(85.90)	70-100
	259	14-30+	M	115	(114.82)	100-130
	152	14-30+	F	100	(100.80)	85-115
Hemoglobin, gm ...	215	4-13	M & F	12.0	(11.92)	10.0-14.0
	259	14-30+	M	15.8	(15.84)	14.0-18.0
	152	14-30+	F	13.8	(13.91)	11.5-16.0
Hemoglobin coefficient	215	4-13	M & F	12.0	(11.87)	10.20- 13.80
	259	14-30+	M	14.7	(14.66)	12.75- 16.75
	152	14-30+	F	14.3	(14.41)	12.50- 16.00
Cell volume, cc. per 100 cc	215	4-13	M & F	36	(36.02)	31-41
	46	14-17	F	36	(36.73)	31-41
	63	14-19	M	41	(40.14)	36-45
	106	18-30+	F	41	(40.96)	36-45
	153	20-30+	M	45	(44.79)	40-50

	No of Sub-jects	Age, Years	Sex	Average Values		Range of Values
				Clinical	Actual	
Volume coefficient ...	304	4-17	M & F	36	(36.31)	31-41
	173	18-30+	M	41	(40.29)	35-45
	106	18-30+	F	43	(42.83)	38-47
Color index ...	626	4-30+	M & F	1	(1.00)	0.85-1.15
Volume index ...	583	4-30+	M & F	1	(1.00)	0.85-1.15
Saturation index ...	583	4-30+	M & F	1	(1.00)	0.90-1.10
Reticulocytes, percent- age ...	476*	4-30+	M & F	1.5	(1.46)	0.50-3.00
Leukocyte count ...	86	4-7	M & F	10,400	(10,365)	6,000- 15,000
	242	8-18	M & F	8,300	(8,342)	4,500- 13,500
	269	19-30+	M & F	7,400	(7,447)	4,500- 11,500
Segmented neutrophils, percentage	241	4-14	M & F	38	(37.60)	18-58
	120	15-19	M & F	48	(47.65)	25-75
	236	20-30+	M & F	54	(54.26)	33-78
Neutrophil staff cells, percentage	219	4-13	M & F	3.0	(3.07)	0-10
	378	14-30+	M & F	0.8	(0.78)	0-5
Lymphocytes, percentage	241	4-14	M & F	48	(48.21)	21-71
	120	15-19	M & F	42	(41.91)	22-62
	236	20-30+	M & F	38	(37.76)	18-65
Monocytes, percentage	219	4-13	M & F	3	(3.08)	0.5-7
	378	14-30+	M & F	4	(4.18)	0-9
Segmented eosinophils, percentage	219	4-13	M & F	2.8	(2.79)	0-8
	378	14-30+	M & F	1.9	(1.90)	0-6
Segmented basophils, percentage ...	597	4-30+	M & F	0.5	(0.52)	0-2
Disintegrating cells, per- centage	219	4-13	M & F	5.0	(4.89)	0-10
	378	14-30+	M & F	3.5	(3.47)	0-7
Sedimentation rate, mm. in 15 min. ...	853*	4-30+	M & F	—	—	0-5
Sedimentation rate, mm. in 45 min. ...	853*	4-30+	M & F	—	—	1-30

* The discrepancy between these values and those recorded on the charts is due to the fact that the ages were not recorded for some of the adults studied.

H. H. S.

RADHAKRISHNA RAO (M. V.). Histopathology of the Liver in "Infantile Biliary Cirrhosis."—*Indian Jl. Med. Res.* 1935. July. Vol. 23. No. 1. pp. 69-88. With 32 figs. (4 coloured) on 8 plates. [63 refs.]

That a peculiar type of cirrhosis of the liver occurs in Indian children has been known for nearly half a century, being first described by SEN in 1887. Apart from a few cases of a like character reported from Mexico and North China the condition seems to be peculiar to India. Accurate description of the morbid anatomy and histology present in this disease will do much to elucidate its, at present, obscure pathogeny, hence the value of this detailed account based on a study of 5 cases of so-called "infantile biliary cirrhosis." Various staining methods were employed. The subjects from which the tissues were taken were between 1 year and 6 months and 3 years (the age of one was not known). The histories, so far as they were ascertainable, and the state of the liver in each case is related (changes in other organs receive a word or

two in two of the cases only). In one case there are superadded inflammatory changes of cholangitis and surrounding infiltration but the lesions in the others are as follows. The hepatic cells are necrosed generally throughout the liver, some more, others less; in the meshes of an oedematous non-vascular connective tissue are islets of hepatic tissue, some degenerating; the hepatic vessels but not the portal, show obliterative lesions (well demonstrated in the camera lucida drawings), with disorganization of the reticulum of the sinusoidal capillary bed round these venous terminals and, lastly, attempts at regeneration of the parenchymal cells.

The microphotographs and the coloured camera lucida drawings are very clear and instructive.

The genesis of the fibrous tissue is traced to "atrophy and degeneration of the parenchymal mantle around the hepatic venous tree (due to an interference with the free flow of portal blood)" owing to sclerosis of the veins and endophlebitis. The changes are in fact those described in toxic cirrhosis, but the coexistence of regenerative and degenerative processes indicates a toxin of sub-acute properties, the determination of which must be the subject of further investigation. *H. H. S.*

CULBERTSON (James T.). Antibody Production by the Rabbit against an Ectoparasite.—*Proc. Soc. Experim. Biol. & Med.* 1935. May. Vol. 32. No. 8. pp. 1239-1240.

The serum of rabbits heavily infested by the mite *Psoroptes communis* var. *cuniculi* gives a precipitate with an extract from the bodies of the mites, whereas the serum of uninfested rabbits does not. The sloughing of the affected skin is possibly an Arthus reaction resulting when the specific antigen of the mite saliva is introduced into the sensitized animal. *V. B. Wigglesworth.*

BISHOPP (F. C.) & SMITH (Carroll N.). Mosquito Work throughout the World in 1934.—Reprinted from *Proc. 22nd Ann. Meeting New Jersey Mosquito Extermination Assoc., Mar. 6, 7 & 8, 1935.* 27 pp.

The paper, which is one of a series appearing every year, summarizes current work on mosquitoes and their relation to disease. It deals among other things with taxonomy, the relation of mosquitoes to malaria and yellow fever, surveys in particular areas, efforts at control and studies on food, resting places and hibernation. The paper concludes with a special section on the control of mosquitoes in North America.

It is difficult to give a short résumé of something which is in itself a review. Perhaps the British reader, familiar at first hand with the greater part of the work, will be most interested in the account of the extensive operations carried out in the southern part of the United States. The work there was undertaken partly in the interests of health, partly to provide useful work for the unemployed under the Emergency Relief Administration. We understand that a vast amount of draining and such work was carried out, but that there is some question whether the rural population in the areas drained will be able to maintain the work in a normal year and whether the ditches may not themselves become dangerous breeding places. *P. A. Buxton.*

FENG (Lan-Chou). **The Present Status of the Knowledge of the Mosquitoes of China and their Relation to Human Diseases.**—*Chinese Med. Jl.* 1935. Nov. Vol. 49. No. 11. pp. 1183-1208. With 2 charts, 1 map & 10 figs. on 6 plates. [72 refs.]

The author presents a full review of our present knowledge of the mosquitoes of China and of their relation to malaria, filariasis and dengue.

Of the species of Anopheles, *Anopheles hyrcanus* is the most widely distributed for it is found in plains of most parts of China. In South China some fifteen species of Anopheles occur, most of them derived from the Oriental Region. In this area the most important carriers of malaria appear to be *A. minimus* and *jeyporiensis*, though *maculatus* also occurs. The southern species extend northwards to approximately 30° North. In the north of China (from 35° to 40° North) the most important species is *Anopheles pattoni*, which breeds in the hills, generally in running water. Distribution of the Culicines, which is discussed less fully, also shows that the fauna is partly southern, partly northern in origin, as is natural in so great a territory. The paper includes a tabulated statement of what is known of the infection of Anopheles in China with Plasmodium; the author has included the results of dissection of wild specimens and the experiments carried out in laboratories. He proceeds to discuss the species principally concerned in transmission.

The section dealing with types of malaria and their distribution is not so full and it is confined mainly to what has been learned since the subject was reviewed by FAUST in 1926. It is clear that south of the Yangtse River malaria is widely spread and of greater or less gravity, also that all three types of parasites occur. In North China malaria is less abundant and it is generally of the benign tertian type.

Some years ago the author gave an account of the distribution of filariasis due to *Wuchereria bancrofti* in China. The disease is particularly abundant in the provinces along the south part of the coast and along the lower course of the Yangtse River. Recent work has shown that *Microfilaria malayi* is not rare and that it is rather widely spread. The mosquito hosts of these parasites have been investigated in the laboratory and it is now clear that *Culex fatigans* is not the only carrier of *W. bancrofti* in China; indeed it is less efficient than *C. pipiens*. Several other mosquitoes have been studied and shown to be inefficient carriers, but it seems that species of Anopheles transmit it readily enough. *Microfilaria malayi* develops well in Anopheles and in Mansonioides. Results of dissecting wild mosquitoes, mostly taken from houses, are also reported, but the author is wisely sceptical of their value, recognizing how difficult it is to identify a larval nematode in a mosquito.

A full list of references brings this useful piece of work to an end. The paper will stimulate workers to supply information on many matters about which we know nothing at present. P. A. B.

HEADLEE (T. J.). **The Development of Mechanical Equipment for sampling the Mosquito Fauna and Some Results of its Use.**—*Proc. 19th Ann. Meeting New Jersey Mosquito Extermination Assoc.*, 1932. pp. 106-126. With 2 plates.

BRADLEY (G. H.) & McNEEL (T. E.). **Mosquito Collections in Florida with the New Jersey Light Trap.**—*Jl. Econom. Entom.* 1935. Oct. Vol. 28. No. 5. pp. 780-786.

The papers deal with an automatic device electrically operated, which will obtain a sample of mosquitoes throughout the night.

The author of the first paper points out that much of what we know about the distribution of mosquitoes and about their density is based on collecting by hand. In this process there is a large element of personal error. He has been anxious to substitute some more standardized and perhaps more effective method, and he has finally produced a trap into which a 50-watt Mazda lamp attracts mosquitoes, and from which they are swept by a fan into a cyanide bottle. In its final form the trap catches roughly twice as many insects per hour as an expert man, including large numbers of all the commoner species. By making slight alterations to the trap the author has accumulated information about the time of night at which certain species fly.

The second paper sets out results obtained in Florida and shows that the trap has considerable utility: it catches a great variety of species including many males, and considerable numbers of *Anopheles* of several species. The paper contains detailed information about several mosquitoes which are locally important. It is not suggested that the trap obtains an unbiased sample of all the prevalent mosquitoes, but it is clear that its results give a valuable confirmation of what may be obtained by other methods.

P. A. B.

RUSSELL (Paul F.) & BAISAS (Francisco E.). **The Technic of Handling Mosquitoes.**—*Philippine Jl. Sci.* 1935. Mar. Vol. 56. No. 3. pp. 257–294. With 12 figs. & 8 plates. [27 refs.]

The ground covered by this paper, which is concerned with conditions in the Philippines, is a good deal wider than might be inferred from the title, and includes the collecting of both larvae and adults in addition to subsequent operations. While the bulk of what is stated is to be found in one form or another in various text-books, and should be familiar to the expert, the beginner who studies these pages cannot fail to acquire useful information. *Inter alia*, whosoever aspires to become a competent collector of mosquito larvae is warned that he will never do so if he fear to wet his feet; but by way of compensation he is told that a diurnal search for adults, in typical shelters such as small caves, “presents no difficulties” apart from the fact that snakes occasionally choose to lie up in the same retreats. “Artificial daytime shelters” [presumably free from the last-mentioned drawback] “can be made by lining boxes with moist earth,” and a simple but ingenious method of doing so is duly described.

E. E. Austen.

DE MEILLON (Botha) & OSBURN (H. S.). **A Case of Intestinal Myiasis caused by the Larvae of *Chrysomya chloropyga*, Wied. (Diptera, Calliphorinae).**—*South African Med. Jl.* 1935. Sept. 28. Vol. 9. No. 18. pp. 654–655.

The patient, an African girl, passed numbers of larvae in her stools after “a vermifuge” had been administered. Her mental state subsequently became brighter and the “fits” of which she had complained less frequent.

The identification of the fly was made on larval characters, adults not being bred. *Chrysomya chloropyga* is a widely distributed African insect, breeding commonly in carcasses, and occasionally causing external myiasis of man and animals, especially sheep. It seems that there are no recorded cases of intestinal myiasis, due to this or other

members of the genus *Chrysomyia*. It is remarkable that cases have not been observed, for it is evident from the facts here recorded that this insect can support life in the human intestine. P. A. B.

PARISH (H. E.) & LAAKE (E. W.). **Species of Calliphoridae concerned in the Production of Myiasis in Domestic Animals, Menard County, Texas.**—*Jl. Parasitology*. 1935. Aug. Vol. 21. No. 4. pp. 264-266.

The purpose of the observations described in this paper was to determine what other flies besides the screw-worm fly (long referred to as *Cochliomyia macellaria*, but now known to be really *C. hominivorax*—see this *Bulletin*, 1934, Vol. 31, p. 359) are responsible for wound myiasis in domestic animals in the south-western United States, and the extent of the injuries so caused. The latter question is not dealt with in detail, but the results of collecting and breeding out maggots from wounds in sheep, goats, calves and cattle during the period August, 1931, to July, 1933, are summarized. In summer and autumn, screw-worm flies formed more than 99 per cent. of all adults reared from larvae found in wounds on the above-mentioned livestock. On the other hand, during the spring of 1933 upwards of 67 per cent. of all flies so obtained were *Phormia regina*, "a cold-weather species of blowfly and very abundant during early spring." In two or three cases a few larvae of a flesh fly, *Sarcophaga plinthopyga*, were found. E. E. A.

JAMES (J. F.). **A Simple Fly Trap.**—*Jl. Roy. Army Med. Corps*. 1935. Dec. Vol. 65. No. 6. pp. 400-401. With 2 figs. [Summary appears also in *Bulletin of Hygiene*.]

The author describes a trap easy to make and without the drawbacks of the commonly used wooden trap with rollers. The accompanying illustrations give a good idea of the contrivance. A piece of an ordinary ghi tin 14 in. by 9 in. by 9 in. is cut away as shown in Fig. 1, the lower line being 3 inches from the base and the upper bisecting the top. If desired straight cuts may be made, as in Fig. 2, thus removing a rectangular instead of an inclined plane or shovel-shaped piece; a stout wire across the top, 2 inches from the back, serves the double purpose of hanging up the trap and of supporting material, such as

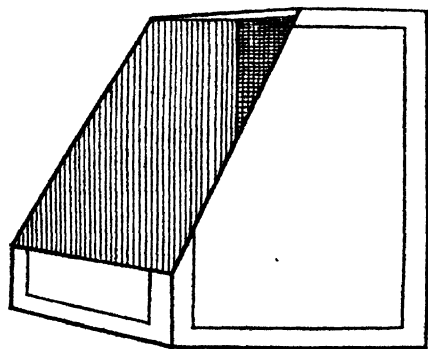


Fig. 1.

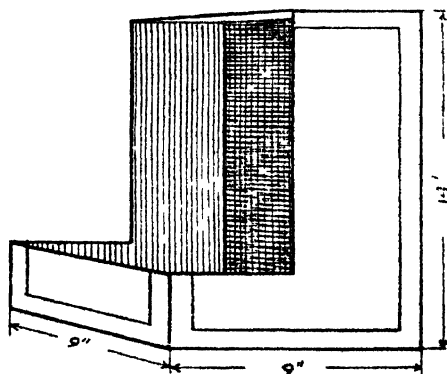


Fig. 2.

Fly traps, made from ghi tins or similar tin receptacles, to contain sugar or gur arsenic poison bait.

[Reproduced from the *Journal of the Royal Army Medical Corps*.]

gunny, which passes down to the bottom and covers the floor of the tin, on which the poison chosen is placed, about an inch deep. The lower part of the gunny is thus kept wet and the back can be wetted by merely laying the tin on its back. The tins "are collected, cleaned, and the solution changed twice weekly under the direct supervision of a sanitary inspector."

H. H. S.

GENEVRA (J.), GASCHEN (H.), AUTRET (M.) & DODERO (J.). *Paederus* vesicants (*P. fuscipes* et *P. alternans*) au Tonkin. Etude entomologique, clinique et expérimentale. [Vesicating *Paederus* in Tonking.]—*Arch. Inst. Pasteur d'Indochine*. 1934, Apr. No. 19. pp. 313–329. With 1 coloured plate & 9 figs. on 5 plates. [18 refs.]

As is well known to the natives, most cases of vesicular dermatitis in Tonking are caused by the beetles *Paederus fuscipes* and *P. alternans*.

The toxic substance has chemical properties identical with those of cantharidin. When applied to the skin of man or animals it produces lesions of the same kind as does cantharidin, and when injected it causes a glomerular nephritis. This active principle occurs in the blood of the insect and therefore escapes from any part of the body that is crushed.

V. B. Wigglesworth.

PERRY (H. Marrian) & POOLE (L. T.). **A Common Caterpillar Injurious to Man.**—*Jl. Roy. Army Med. Corps*. 1935. Oct. Vol. 65. No. 4. pp. 217–220. With 3 figs. & 1 plate.

Skin lesions due to the larvae of the Brown-tail Moth, *Euproctis chrysorrhoea*, can be caused by any of the larval hairs. Cases are described which show that the sensitivity of different subjects varies greatly and that the rash may vary from a transient urticaria to a vesicular rash requiring several days to develop.

V. B. Wigglesworth.

HAPPOLD (Frank Charles) & STEPHENSON (Dora). **The Toxicity of Bactericidal Substances for Flagellate Parasites, with Special Reference to their Application in the Isolation of *Leptomonas* Forms.**—*Parasitology*. 1935. July. Vol. 27. No. 3. pp. 383–393.

In a previous paper BOXHALL, Happold and LLOYD (*Parasitology*. 1934. Vol. 26. p. 44) have shown that cultures of leptomonads of certain flies can be obtained free from bacteria by mixing the intestinal contents with certain concentrations of quinamil and allowing the mixture to stand for some time before inoculation into culture media. The exposure to quinamil in some cases destroyed the bacteria and not the flagellates. The present paper describes the testing of other substances, with the result that besides quinamil the compound 2 (*p*-dimethyl-aminoanil)- β -naphthoquinoline methochloride might be successfully used. For the purification of contaminated leishmania cultures the procedure was not successful.

C. M. Wenyon.

TOKURA (N.). Biologische und immunologische Untersuchungen ueber die menschenparasitären Trichomonaden. [**Biological and Immunological Research on Trichomonads Parasitic for Man.**—Reprinted from *Igaku Kenkyu*. 1935. Apr. Vol. 9. No. 4. [In Japanese. [325 refs.]. German summary 13 pp. With 19 figs. on 2 plates.]

Working with cultures of various human trichomonads the author has found that their intravenous injection into rabbits results in the formation of species specific immune bodies the presence of which is indicated by the property of producing lysis in dilutions up to 1 in 4 and agglomeration in dilution of 1 in 6 of the flagellates in question. A trichomonad antigen is as capable of giving rise to complement fixing bodies as are bacteria. These serological studies with trichomonad flagellates appear to be the first of their kind. C. M. W.

GUPTA (B. M. Das). Some Observations on Pure Line Strains of *Trichomonas hominis* and *Trichomonas* of the Snake *Natrix erythrogaster* (a Non-Poisonous Water-Snake).—*Jl. Trop. Med. & Hyg.* 1935. June 15. Vol. 38. No. 12. pp. 148–151. With 28 figs. on 2 plates.

The morphology of both *Trichomonas hominis* and a *Trichomonas* of the snake is described from pure line cultures started from single individuals. Both forms possessed four anterior flagella and one on the undulating membrane. The membrane flagellum in some cases became detached and acted as a trailing flagellum but in such cases there was no actual resemblance to *Eutrichomastix*, which is a distinct flagellate in the snake. In the case of *Trichomonas hominis* the dividing forms appeared to indicate that the axostyle divides longitudinally.

C. M. W.

VITTORIO (Vanni). Ricerche sulla sarcosporidiosi. [**Investigations on Sarcosporidia.**—*Ann. di Med. Nav. e. Colon.* 1935. Mar.–Apr. 41st Year. Vol. 1. No. 3–4. pp. 145–181. With 31 figs. (11 coloured) on 5 plates. [34 refs.]

In this paper the author describes certain experiments he has made with the sarcosporidian of the sheep, *Sarcocystis tenella*. He claims to have discovered that the spores ingested by flies (*Sarcophaga* and *Calliphora*) in the course of 24–48 hours become converted into metacyclic forms, some of which at least are provided with flagella. These metacyclic forms are passed in the faeces of the flies. Of two rats fed with the faeces of infected *Sarcophaga* and two with those of *Calliphora*, one of the latter 40 days later was found to have developing sarcosporidia in most of the muscular system. As rats fed with spores taken directly from the sheep did not become infected it is concluded that *Calliphora* is the intermediate host of *Sarcocystis tenella*. The changes which take place in the flies are illustrated in a series of plates. Though the authors state that they have been careful to exclude flagellate and other natural infections of the flies one is still left with the impression that some of the so-called metacyclic forms, particularly the flagellates, may actually be natural parasites of the flies. C. M. W.

CHEISSIN (Eug.). Vom Einfluss anaërober Bedingungen auf verschiedene Sporulationsstadien der Oocysten von *Eimeria magna* und *Eimeria stiedae*. [Effect of Anaerobiosis on Development of *Eimeria*.]—*Arch. f. Protistenk.* 1935. Vol. 85. No. 3. pp. 426–435. With 1 fig.

Under anaerobic conditions the oöcysts of rabbit coccidia will neither begin nor complete sporulation though the intervening development will take place. C. M. W.

CIFERRI (R.) & REDAELLI (P.). Une quatrième espèce du genre "Histoplasma." [A Fourth Species of the Genus *Histoplasma*.]—*Boll. Sezione Ital., Soc. Internaz. di Microbiologia.* Milan. 1935. July. Vol. 7. No. 7. pp. 245–252.

The authors refer to three papers recently published by them. In the first they showed, experimentally, that Darling's Histoplasmosis is a mycosis of the reticulo-endothelial system; in the second they advanced arguments for the inclusion of *Cryptococcus farcinimosus* Riv. & Mic. in the genus *Histoplasma*; in the third they pointed out affinities existing between *H. farcinimosum* (Riv. & Mic.) Cif. & Red., and *H. capsulatum* Darling, and described a third species of the genus: *H. muris*.

The present paper attempts to show that a yeast-like fungus isolated from a disease resembling dermatitis exfoliativa by Hansmann and Schenken in the United States and named by them *Sepedonium* sp. Hans. & Schenk., is in reality a new species of *Histoplasma*; the fourth species of the genus.

Ciferri and Redaelli refute the recommendation of Moore, that the fungus should be placed in the genus *Posadasia* Canton as *P. pyriformis*, Moore, on the grounds that insufficient evidence was put forward.

In giving their reasons for naming the new fungus *Histoplasma pyriformis* (Moore) Cif. & Red. n. comb., Ciferri & Redaelli admit that, up to the present, they have had no opportunity to examine the fungus in culture or in the tissues, and their study was limited to the published description by Hansmann and Schenken and the accompanying photomicrographs.

The clinical condition is of great interest and the description should be read in the original paper by Hansmann and Schenken. It commenced as a dry scaly lesion on the back of the leg and spread gradually over the whole surface of the body, suggesting dermatitis exfoliativa; but the ultimate diagnosis was "dermatitis associated with lymphadenitis." The disease resisted treatment and ended fatally after a duration of fifteen years. In addition to the skin and lymphatic lesions, the mouth showed a local condition of thickening of the mucosa with little granular lesions, erosions and ulceration.

The fungus was isolated during life from the skin, an inguinal gland and the buccal mucosa, and sections of the tissues showed it to be present as little yeast-like bodies chiefly enclosed within phagocytes and endothelial cells but occasionally free in the tissues.

The autopsy showed no enlargement of the spleen or liver but cirrhosis of both these organs; all the superficial lymphatic glands were enlarged and hard and contained the parasite; the adrenals showed zones of caseous necrosis, resembling tuberculosis, in both medulla and cortex, and the parasite was present; in the lungs the parasite assumed

the pyriform shape, and in the skin the mononuclears were sometimes filled with "yeasts"—as many as 20 or 25, each with a well defined capsule, being included within a cell. Giant cells were relatively rare. The parasite, which resembled in appearance the Leishman-Donovan body had a diameter of 3μ to 6μ but varied in size. It was enclosed in a colourless capsule and occasionally showed evidence of budding.

The fungus was easily cultivated on various media at 28°C . and 30°C .; growing aerobically it formed a mycelium "irradiating" yeast cells, but under anaerobic conditions it formed only rounded yeasts. In hanging drop cultures, chlamydospores, apical and intercalary, developed in the mycelium.

Guineapigs and rabbits were found resistant to experimental infection but dogs and mice were susceptible, and, after subcutaneous inoculation, developed lesions of the disease in the lungs, spleen, adrenals and liver. Retroculture was obtained from the animals three to four weeks after inoculation.

On the following analogies to *H. capsulatum*, Ciferri and Redaelli regard the parasite as a species of *Histoplasma*.

(1) Multiplication in the tissues, by budding, of little cells enclosed in a hyaline capsule. The cells are occasionally free but are usually enclosed within macrophages and the reticulum cells of the spleen and lymphatic glands.

(2) Multiplication *in vitro* by mycelium and chlamydospores in conditions of normal life, and as colonies of yeasts under particular conditions.

(3) The formation in culture of resistant cells (chlamydospores and stalagmospores), at first smooth, then tuberculated, verrucose or spinous.

(4) The disease caused is resistant to all treatment attempted and ends fatally.

(5) Amongst laboratory animals, dogs are particularly receptive to infection, and, after inoculation, the disease evolves in them as a generalized infection of the reticulo-endothelial system.

J. T. Duncan.

CHOPRA (R. N.), GUPTA (J. C.) & ROY (A. C.). **Action of Emetine on the Activity of the Adrenal and Thyroid Glands.**—*Indian J. Med. Res.* 1935. Apr. Vol. 22. No. 4. pp. 771-776. [12 refs.]

Chopra and co-workers showed that in Belgian hares after intravenous injections of organic compounds of antimony there was a definite increase in the residual epinephrine content of the adrenal glands as compared with the normal gland; after ten injections the adrenalin content was almost doubled. Large doses of organic arsenicals produced a remarkable decrease in the residual adrenalin.

As a result of the work here described it is shown that after a series of 8 intravenous injections of small (therapeutic) doses of emetine hydrochloride in Belgian hares there is a definite decrease in the residual adrenalin. The iodine content of the thyroid gland is also decreased and runs more or less parallel with the adrenalin content.

A. G. Bagshawe.

GESSNER (Otto) & ESSER (Werner). Ueber die analeptische Wirkung des Salamanderalkaloides Samandarin. [The Restorative Action of Samandarin.]—*Arch. f. Experim. Path. u. Pharm.* 1935. July 16. Vol. 178. No. 6. pp. 755-759. [12 refs.]

Samandarin is an alkaloid obtained from the cutaneous glands of certain species of salamander and is a poison producing convulsions.

In experimental work it was found to act as a respiratory stimulant in warm-blooded animals and in the present article the authors relate experiments to test the restorative action of the toxin in narcotized animals, both cold- and warm-blooded. Its action is on the medulla oblongata. As examples of cold-blood animals salamander-larvae were utilized and as warm-blooded the rabbit. The narcotics used in the case of the former were ethyl alcohol, chloral hydrate, avertin, and veronal; for the latter methane subcutaneously and paraldehyde by mouth. The effects on warm-blooded animals are the only ones of interest here. These were, first, acceleration and deepening of respiration, followed by rise of blood pressure due to stimulation of the vasomotor centre. But, the authors conclude, the therapeutic range of this poison as an analeptic is limited because of its convulsant action in any but minute doses.

H. H. S.

RAMAQA (Vilikesa T.). My Experiences during a Visit to Ono-I-Lau.—
Native Med. Practitioner. Suva. 1935. Sept. Vol. 2. No. 3.
pp. 310-313.

The Native Medical Practitioner trained at the Central Medical School, Suva, has proved of great assistance in treatment of the sick and in inculcating the principles of hygiene among the scattered populations in the Western Pacific. From this brief account it is clear also that he finds a varied assortment of ailments to keep him in practice. Thus in a visit to Ono to inspect four villages with a combined population of a thousand or so the author saw 265 cases of hookworm infestation, 230 of influenza (introduced by return of visitors to a provincial meeting on another island), 118 of filariasis, 131 with injuries, 158 with alimentary complaints, 15 needing tooth extraction, 23 with trachoma, 4 with pulmonary tuberculosis, and a few cases of other conditions, such as yaws and ear disease. [See this *Bulletin*, 1934, Vol. 31, Suppl. p. 163* and 1935, Vol. 32, Suppl. p. 204*.]

H. H. S.

WILSON (H. Ellis C.) & MOOKERJEE (S. L.). Some Possible Factors in the Causation of Vesical Calculus in India. The Composition of the Human Urine on Different Diets.—*Indian Jl. Med. Res.* 1935. Oct. Vol. 23. No. 2. pp. 491-499.

Much work has been carried out to determine the aetiology of vesical calculus. It has been shown that there is a high incidence of the disease in rats fed on a diet deficient in vitamin A. Later the cereal factor came into play, in addition; a diet rich in wheat containing extra lime but deficient in vitamin A was found very potent in producing calculus, oatmeal also but to a smaller degree. In Bengal the diet is probably as poor in vitamin A as is that of the Punjab, but rice is the chief cereal and lithiasis is less prevalent.

Investigations have been carried out by the authors to determine in a healthy subject the urinary products when an atta diet is given like that in the Punjab and when a rice diet is taken. Protocols are shown giving details of the analyses and the authors conclude that the urinary factors favourable to the development of calculus on an atta diet are two, viz. :—

“(1) A reduced urine volume on an atta diet as compared to a rice one, primarily due to a diminished salt intake—on the former diet but possibly accentuated by a diuretic principle present in rice. Up in the Punjab as compared to Bengal this factor might be still further accentuated due

to increased perspiration and salt loss through the skin. This would increase the tendency to the separating out of certain urinary constituents.

"(2) An increased oxalate and phosphate excretion in the urine on an *atta* diet—and on account of the reduced urine volume an increased concentration of these substances in the urine. The amount of calcium excreted in the urine is more than sufficient to combine with the oxalate and form an insoluble salt."

H. H. S.

MARTIN (Hubert). **The Standardisation of Petroleum and Tar Oils and Preparations as Insecticides.**—*Ann. Applied Biol.* 1935. May. Vol. 22. No. 2. pp. 334–414. With 1 fig. [74 refs.]

The scope of this paper is indicated by its title. It is summarized here because emulsions containing mineral oils are frequently used to control insects of medical importance.

Users of insecticides and fungicides have a right to demand some form of guarantee that the products should reach a reasonable standard of efficiency and should not vary greatly in quality. Some detailed specifications are therefore desirable to which manufacturers would agree to conform, in the same way as "A.R." reagents and drugs are made to conform to specifications. At the suggestion of a committee set up by the Conference of Advisory Entomologists in December 1933, the author undertook to draw up draft specifications and methods of analysis, which are here presented with a rather full review of the evidence in their favour.

A number of items are specified by an oil company of which some, such as flash and fire points, pour and cold tests, are quite unnecessary for this purpose. Those which are useful are the distillation range (some writers prefer a measure of the volatility at ordinary temperatures), viscosity, and specific gravity (useful because it gives information as to composition, *e.g.*, more aromatics, higher S.G., and is very simple to measure) among physical properties; and the unsulphonated residue or some equivalent test among chemical properties. If the material is a preparation which requires only dilution with water to be ready for use, it should be specified whether it is a "miscible oil," *i.e.*, plain solution of an emulsifier such as fatty acid soap or beta petroleum sulphonic acid soap, in the oil, or a "stock emulsion," *i.e.*, concentrated emulsion; the emulsifying agent should be given.

The correlation between the physical and chemical properties of an oil and its biological performance is facilitated by distinguishing between winter washes (for the dormant and leafless plant) and summer washes (for the foliage-bearing plant).

With winter washes most workers have found insecticidal action not very dependent on physical properties. Above a certain minimum viscosity it is independent of this property and within wide limits is independent of boiling range. The unsulphonated residue should not be less than 60 per cent., *i.e.*, 60 per cent. of paraffin should be present. As this represents some degree of refinement, other chemical specifications are unnecessary. The type of emulsifier does not appear to influence the insecticidal activity, but the oil should be 100 per cent. "neutral oil" and free from alkali. Phytocidal activity may be neglected for winter washes, so that specific gravity, viscosity, boiling range and unsulphonated residue form a sufficient specification, together with oil content if it is a preparation capable of direct dilution with water.

With summer washes the phytocidal aspect is more important than the insecticidal. The latter, as for winter washes, is largely independent of physical properties over a wide range. There is no evidence that increased refinement diminishes the insecticidal potency. Phytocidal injury is of two types, (a) acute, in which leaf tissue perishes in a few days; this is attributable to chemical constituents; (b) chronic, appearing later and associated with metabolic changes possibly brought about by physical factors. Thus high viscosity may affect transpiration, reports having been made that apples are smaller on trees treated with heavy lubricating oil although it was devoid of constituents causing acute damage. This suggests that an upper limit to viscosity and boiling range should be specified. Acute phytocidal injury is acknowledged to be due to those constituents which are removed by sulphuric acid and the unsulphonated residue should definitely be fixed at a high figure—90 per cent is recommended. The author believes it unnecessary to give the iodine value, and the same four criteria are sufficient as for winter washes, with more precision in the ranges allowed. Since many users of sprays like to make a combined wash with some other insecticide, or fungicide, the manufacturer should state whether the emulsifier is such that it can be mixed with lead arsenate, lime-sulphur or Bordeaux mixture, etc.

For intermediate bud-burst washes some modifications are permissible and the unsulphonated residue may be fixed at a minimum of 80 per cent.

Tar Oils.—Tar oils differ from petroleum oils in the almost complete absence of paraffins and naphthenes and the presence of tar acids and tar bases. Industrial specifications usually give content of neutral hydrocarbons, tar acids and bases as well as specific gravity and boiling range.

Tar oils are less effective than petroleum oils against eggs of geometrids and capsids and to some extent against acarids, but more effective against eggs of aphids and psyllids. It is, therefore, supposed that they have a direct toxic action apart from their physical stifling action. Higher boiling fractions are more toxic, as with petroleum, and support the hypothesis that permanence of the film is the important factor.

The general conclusion of workers is that tar acids do not contribute very much to insecticidal power, are in fact less efficient than the neutral oils. The same applies to tar bases on which, however, less work has been done. The solid hydrocarbons of tar oils also seem to contribute little to the toxicity and are objectionable to the user.

Tar oils have considerable phytocidal action, as might be expected, both the aromatic hydrocarbons and the tar acids being active. Nevertheless some workers have reported no injury to young buds of gooseberry or currant with 10 per cent. tar acid content. Normally, however, tar oils are only used for winter washes, or their phytocidal properties are turned to account to combat mosses and lichens.

The different susceptibility of eggs to tar and petroleum oils makes it often advantageous to combine these oils in a dormant wash. It has become customary in fact to include a small proportion of high boiling petroleum oil in tar oil without disclosing it. An extra specification, the amount insoluble in dimethyl sulphate (in which aromatics are entirely soluble) is therefore desirable. For a simple tar oil it should be nil, but up to 10 per cent. is permissible in a marketed tar oil and more in a tar-petroleum preparation. A maximum figure should be allowed in

the specification coupled with a minimum figure for unsulphonated residue. In addition the specification should contain the neutral oil content, tar acid content (tar bases content is usually neglected) and content in solid matter as well as boiling range and specific gravity. Neutral oil content may be sacrificed (say from 88 per cent. minimum to 75 per cent. minimum) to tar acid content if the oil is only for use against aphid and psyllid eggs where specific toxic action comes into play. The type of emulsification in preparations ready for simple dilution should be specified, as with petroleum oil preparations.

In the next section the specifications are applied to a number of oils and oil preparations, both marketed products and experimental mixtures, with criticisms. The paper ends with a description of the analytical methods recommended and reasons for their recommendation.

D. R. P. Murray.

REVIEWS AND NOTICES

GATER (B. A. R.) [King Edward VII College of Medicine, Singapore].

Aids to the Identification of Anopheline Imagines in Malaya.—
242 pp. With 236 figs. & 9 plates. 1935. Singapore: Govt.
Printing Office. [\$1.]

The author, whose "Aids to the Identification of Anopheline Larvae in Malaya" was reviewed in this *Bulletin* [1934, Vol. 31, p. 755] some eighteen months ago, has completed his scheme by the publication of the present handbook, and in so doing has placed students of Oriental anophelines still further in his debt. As explained in the "Introduction," the arrangement is on practically the same lines as those followed in the former volume, and, for the avoidance of confusion, the nomenclature of species and subspecies is the same as that previously adopted. Material in the possession of the College of Medicine, Singapore, is still insufficient to warrant final conclusions as to the precise identity of all Malayan representatives of the genus *Anopheles*, but, once this impediment has been removed, it is hoped to issue a revised edition of both "Aids" in a single volume.

After a fairly detailed account of the external and internal anatomy of adult anophelines, the present instalment deals with "Life-History and Habits," and a series of practical matters such as "Collecting and Rearing," "Preserving and Mounting," and the making and utility of surveys, before, as in the volume devoted to larvae, providing a "Table for Rapid Identification," and "Brief Descriptions of Species."

Neglecting the primary subject of the identification of species, with which a reviewer, as such, is fortunately not called upon to deal, passing reference may be made to certain points of interest in the general body of the text.

The fact that trapping experiments have shown that some species of *Anopheles* are active throughout the night until dawn is held to be not without importance, "in view of the practice in many hospitals of removing the nets from patients' beds before it is light." In stating that anopheline eggs, after deposition, "arrange themselves in star-shaped patterns on the water," the author carries a generalization a little too far; the Mediterranean *A. multicolor*, for instance, lays its eggs horizontally side by side in "ribands"—a highly characteristic arrangement, which once seen cannot easily be forgotten. When discussing length of flight, GATER remarks that, in Malaya, "it is generally assumed that immunity from attack is secured beyond the half-mile limit." It has long been known, however, as was indeed proved years ago in Panama, that dwellings twice so far from an *Anopheles* breeding place may still be invaded, and certain members of the genus travel further than others. Indeed the author himself writes:—"Some species, notably *A. sundaicus*, are exceptionally powerful fliers up to a distance of six miles. The normal range for this species should, perhaps, always be estimated at two miles." Some work has already been done on the seasonal occurrence of *A. maculatus* and *A. minimus* in Malaya and the Far East, and the need of similar investigations in the case of all species of importance is emphasized.

In "Notes on Surveys," the author deprecates the placing of entire reliance on larval surveys, and stresses the importance of studying

imagines, adding that "it may be of great value to continue observations on them over the whole period during which anti-malaria works are in progress and for some time afterwards." He further observes that :—"The presence of males at one end of a town and not at the other is an indication that the breeding-places are in the direction where the proportion of males is greatest, and that the anopheline population of the town is being derived from that quarter." For the estimation of the daily output from breeding places, it may be necessary to determine the age of females, and the various means of doing this (ovarian index, state of the abdomen and of the wing-fringe) are described.

The "Table for Rapid Identification" (pp. 133-147) includes fifty-five species and subspecies, and those "recorded in the Malaysian subregion, but not yet from the Malay Peninsula," or unusually difficult to distinguish, are specially marked. The next eighty-three pages are devoted to brief illustrated descriptions in amplification of the Table, and the publication concludes with two Appendices, the first devoted to equipment and materials, the second consisting of lists of "Species Recorded from Neighbouring Countries (including the outlying islands)."

Well printed, arranged and illustrated, and (so far as the reviewer has been able to observe) entirely free from typographical errors, this handy and useful volume forms a worthy complement to its forerunner.

E. E. Austen.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES
BULLETIN.

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[No. 7.]

KALA AZAR.

NAJERA ANGULO (Luis). Las leishmaniosis visceral y cutánea y su importancia en España. [**Leishmaniasis in Spain.**—*Rev. Méd. Barcelona*. 1935. Dec. Vol. 24. No. 144. pp. 509-528. With 3 figs. (maps). [110 refs.]

This paper is itself in the nature of a review discussing the incidence of leishmaniasis in Spain. Up to the end of 1934 a total of 892 cases of kala azar had been registered in the country together with 27 cases of oriental sore. These figures are compared with records from Portugal, Greece and Italy. The figures are not strictly comparable though they give some indication of the frequency of the disease in these countries. The distribution of the cases according to provinces, ages, sex and association with sandflies is fully discussed. C. M. Wenyon.

NEGRO VAZQUEZ (Emilio). Algunos datos más sobre la leishmaniosis cutánea en el Levante de España. [**Cutaneous Leishmaniasis in Levante, Spain.**—*Medicina Países Cálidos*. Madrid. 1936. Feb. Vol. 9. No. 2. pp. 87-88.

The case of oriental sore here described, and others which have been noted previously, indicate that the disease is endemic on the Valencian coast of Spain. C. M. W.

HERRERO RUBIO (Pedro). Aportaciones al estudio del kala-azar infantil. [**On Infantile Kala Azar.**—*Medicina Países Cálidos*. Madrid. 1935. July. Vol. 8. No. 7. pp. 338-344. With 5 figs.

In writing of infantile kala azar in the province of Alicante in Spain the author points out that spleen puncture may fail to reveal parasites and that the disease can be diagnosed from the clinical features and the characteristic blood picture. Such a diagnosis receives confirmation by the response to specific antimony treatment. C. M. W.

QUARTERLY BULLETIN OF THE HEALTH ORGANISATION, LEAGUE OF NATIONS. GENEVA. 1935. Dec. Vol. 4. No. 4. pp. 787-808. [72 refs.] **On the Diagnosis, Treatment and Epidemiology of Visceral Leishmaniasis in the Mediterranean Basin.** I. Serological Tests [CHRISTOPHERS (Richard)]. II. Treatment [CARONIA; SERGENT (Edm.); PITTALUGA]. III. Epidemiology [SERGENT (Edm.) & MILLER (S.)].

These articles have been written and published mainly for the guidance of those who are not familiar with the subjects dealt with. They do give new information. C. M. W.

PANAYOTATOÛ (A.). Sur les "leishmanioses" en Méditerranée. [*Leishmaniasis in the Mediterranean Countries.*]—*Rev. Méd. et Hyg. Trop.* 1935. Nov.-Dec. Vol. 27. No. 6. pp. 279-310. [30 refs.]

A general summary of knowledge, adding nothing new. C. M. W.

FOURRIER (J.), GENOVA (A.) & DUVERGER (M.). Un cas de leishmaniose viscérale de l'adulte observé dans la région de Bône. [*Kala Azar in an Adult in Bone (N. Algeria).*]—*Arch. Inst. Pasteur d'Algérie.* 1935. Dec. Vol. 13. No. 4. pp. 492-494. With 2 figs. on 1 plate.

A case of kala azar in a man of 24 years of age. The disease was contracted in North Africa. C. M. W.

PAPANTONAKIS (E.). Die Leishmaniosen in der Provinz Messinia (Peloponnes, Griechenland). [*Leishmaniasis in Messenia Province, Greece.*]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Apr. Vol. 40. No. 4. pp. 141-146. With 3 figs. (1 map).

In the mountainous north-west part of the Grecian province of Messenia kala azar in young children and dogs has been endemic for many years. In the flatter south-eastern parts the disease does not occur. Sandflies of the *Phlebotomus major* group were taken in the districts where the human and canine disease occurred. C. M. W.

CHODUKIN (N. I.), PETROV (V. P.) & KEVORKOV (N. P.). [*Epidemiology of Kala Azar in Tashkent.*]—*Trans. Inst. Epidemiol. & Microbiol.* Tashkent. 1934. Vol. 1. pp. 75-145. [In Russian.]

In this paper the authors give an account of the observations conducted in the course of the preceding seven years on the epidemiology of kala azar in Tashkent (Russian Turkestan), which are summarized as follows:—

The distribution of kala azar is focal, the foci of human and canine leishmaniasis (the causative organisms of which are considered to be identical) coinciding in most cases. While dogs constitute the main reservoir, carriers amongst other animals—though not proved—are not excluded. Kala azar has a tendency to spread slowly from the focal areas, frequently dying out and then again reviving in the course of several years.

The seasonal incidence of leishmaniasis in Middle Asia is the same as that in India. Though children provided the majority of cases, infection in adults is not rare. Transmission is effected by sandflies.

Destruction of infected dogs is recommended as the most essential prophylactic measure. C. A. Hoare.

CHAGAS (E.). Nota prévia. Primeira verificação em individuo vivo da leishmaniose visceral no Brasil. [*First Case of Kala Azar, diagnosed during Life, in Brazil.*]—*Brasil-Médico* 1936. Mar. 14. Vol. 50. No. 11. pp. 221-222. With 1 fig.

It has already been noted by PENNA [this *Bulletin*, vol. 32, p. 481] that during the course of examinations of liver specimens obtained *post-mortem* from cases which had died of possible yellow fever occasionally leishmania infections were detected, indicating the possibility of

occurrence of kala azar in S. America. The author of the paper now under review describes the first autochthonous case of this disease diagnosed during life. It was in a youth 16 years of age from Aracaju in the State of Sergipe. The features of the case and the parasites obtained by spleen puncture were characteristic of kala azar. It is noted that in the locality *Phlebotomus longipalpis* occurs in abundance.

C. M. W.

BERREBI (Jacques). La culture des leishmanies. [**The Cultivation of Leishmania.**]—*Arch. Inst. Pasteur de Tunis*. 1936. Jan. Vol. 25. No. 1. pp. 89–141. With 2 charts. [85 refs.]

This is a long paper describing the results of the author's investigations on the culture of leishmania. He commenced with the classical N.N.N. medium as a standard and by introducing various modifications has attempted to discover the factors which influence the growth of the flagellates. It is noted that the optimum concentration of sodium chloride is 1.5 per cent., that the optimum pH is 6 to 6.5, that heating the medium for purposes of sterilization is unfavourable, that the agar base acts merely as a dialysing membrane which permits nutriment to pass into the liquid in a progressive manner, that rabbit's blood can be replaced by the blood of man, ox, sheep, guineapig or rat but not by that of the horse, dog or cold-blooded animals, that the addition of glucose, lactose and particularly maltose helps the growth, that manganese, even in infinitesimal amounts, hinders growth, that calcium favours it, while iron, zinc, magnesium and aluminium are inert, that glycerol added to the liquid of condensation will permit growth of flagellates while killing off contaminating bacteria, thus affording a means of purifying contaminated cultures, that haemoglobin is not necessary, for medium prepared as N.N.N. medium with haemoglobin-free serum will give a good culture when inoculated with flagellates, though sub-culture into the same medium fails. It has not been possible, however, to elaborate another and better medium based on the foregoing data, the classical N.N.N. medium remaining the medium of choice for the cultivation and maintenance in culture of various leishmania and trypanosomes.

C. M. W.

BIANCHI (Luigi). Die Blutmilch als Nährboden für Leishmanien. [**Blood and Skimmed Milk Medium for Cultivation of Leishmania.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Apr. Vol. 40. No. 4. pp. 146–150. With 3 figs.

The author has found that leishmania can be readily cultivated in a medium consisting of rabbit blood 1 part and skimmed goat's or cow's milk 8 parts.

C. M. W.

SAITO (Yasuichi). Investigations on the Biological Characters of *Leishmania donovani*.—*Jl. Oriental Med.* 1936. Mar. Vol. 24. No. 3. [In Japanese pp. 689–713. With 11 coloured figs. on 1 plate. [45 refs.] English summary p. 43.]

The paper describes the results of microchemical and vital staining tests carried out on cultural forms of *Leishmania donovani*. Various granules were brought to light, including oxydase and peroxydase. The nucleus and blepharoplast were the sites of oxidation, while reduction occurred in the cytoplasm, which gave a pH reading of 6.4 to 6.8.

apparently
not hosp.

C. M. W.

DA FONSECA (Flavio). Occorrenza de formas anômalas na *Leishmania brasiliensis*. [**Anomalous Forms of *Leishmania brasiliensis*.**]—*Mem. Inst. Butantan*. 1935. Vol. 9. pp. 185-188. With 22 coloured figs. on 1 plate facing p. 192. English summary (9 lines).

The author has shown that *Leishmania brasiliensis* exhibits the same degree of structural variation as does *Leishmania tropica* of oriental sore. The various types of parasite noted are illustrated in a coloured plate. C. M. W.

ACANFORA (Giuseppe). Osservazioni su alcuni casi di leishmaniosi. [**Some Cases of Leishmaniasis.**]—*Ann. di Med. Nav. e Colon*. 1935. Nov.-Dec. (Supp.) 41st Year. Vol. 2. No. 5-6. pp. 897-915. With 6 figs.

An account of 3 cases of kala azar and 2 of oriental sore which were observed at the clinic for tropical and sub-tropical diseases at Rome. One of the cases of oriental sore showed involvement of the nasal mucosa. C. M. W.

ALBANO (Vincenzo). Su di un caso di kala-azar guarito spontaneamente in un bambino. [**Spontaneous Cure of Kala Azar in a Child.**]—*Pediatrics*. 1936. Mar. 1. Vol. 14. No. 3. pp. 265-267.

The case recorded is that of a child 14 months old in which a diagnosis of kala azar was made both clinically and by the discovery of leishmania in bone marrow obtained by bone puncture. Complete recovery took place without treatment. C. M. W.

CARTIA (Giovanni). Due nuovi casi di kala-azar mediterraneo dell'adulto. [**Two New Cases of Kala Azar in Adults in Italy.**]—*Riv. Sanitaria Siciliana*. 1936. Jan. 15. Vol. 24. No. 2. pp. 80-82, 85-88.

In describing two fresh cases of kala azar in adults in Italy the author gives a list of 59 previously recorded cases in individuals from 13 to 55 years of age. C. M. W.

FRANCO (Enrico Emilio). Considerazioni su di un caso di leishmaniosi viscerale autoctona delle Puglie in un medico di 65 anni. [**Kala Azar in a Medical Man of 65 Years in the Department of Puglie (Italy).**]—*Arch. Ital. Sci. Med. Colon*. 1935. Nov. Vol. 16. No. 11. pp. 790-804. [47 refs.]

The case described was somewhat remarkable on account of the age of the patient who was a medical man from Massafra (Taranto). A complete cure followed a course of intravenous injections of neostibosan. C. M. W.

PIERI (Jean). Deux kala-azar de l'adulte à évolution chronique. [**Two Chronic Cases of Kala Azar.**]—*Marseille-Méd.* 1935. Oct. 15. Vol. 72. No. 29. pp. 453-463.

These cases have already been referred to in a previous issue of this Bulletin, 1936, Vol. 33, p. 26].

BENHAMOU (E.) & FOURÈS (R.). À propos d'un nouveau cas de kala-azar vérifié par les frottis dermiques. L'ascite leishmanienne. [Another Case of Kala Azar confirmed by Skin Smears. Leishmania in Ascitic Fluid.]—*Bull. Soc. Path. Exot.* 1935. Oct. 9. Vol. 28. No. 8. pp. 706-708.

A child $3\frac{1}{2}$ years of age was found by spleen puncture to be suffering from kala azar and was treated with neostibosan. About a year later a relapse appeared to have occurred. This was confirmed by the discovery of leishmania in smears from the skin of the thigh. Leishmania were then found in smears of the skin taken from various parts of the body. Though treatment was followed by general improvement parasites were found in the skin on 15 occasions. Later an attempted spleen puncture yielded only ascitic fluid in which large numbers of leishmania were found. The fluid was re-examined at long intervals and always showed parasites in great abundance, an indication of the intensity of the infection in this case. C. M. W.

LEE (C. U.) & CHUNG (H. L.). A Clinical Study of the Early Manifestations of Chinese Kala-Azar.—*Chinese Med. J.* 1935. Dec. Vol. 49. No. 12. pp. 1281-1300. With 7 charts. [19 refs.]

As very little appears to have been written about the early symptoms of kala azar the authors have studied carefully from this point of view 51 proved cases of the disease which were seen within two months of the onset of symptoms. Apart from the fact that children are generally more susceptible than adults and that in them the disease has a severer course there is no evident predisposing factor. The onset is very insidious. It may simulate typhoid fever in this respect or be quite sudden. The early symptoms in order of frequency are fever, chills, dizziness, headache, anorexia, cough and sweating. The temperature curve may resemble that of malaria, typhoid fever, tuberculosis or undulant fever, or it may be quite irregular. Daily double rises of temperature occur frequently but are not invariable. Remissions of symptoms during which the blood, liver and spleen tend to return to normal are characteristic. Within the first few weeks the only detectable abnormality may be fever but a degree of leucopenia develops early, while a study of the plasma proteids may show an increase in the globulin and euglobulin fractions. Experience has shown that in the presence of an obscure fever accompanied by a progressing leucopenia the possibility of kala azar must be borne in mind. Repeated examinations may have to be made in such cases before leishmania can be discovered. Acute agranulocytosis may occur occasionally as a serious complication during the early course of kala azar. The early cases respond readily to treatment, many becoming completely normal at the end of the fourth or fifth week. C. M. W.

GIRAUD (P.), CIAUDO & BERNARD (R.). Variations des protéines sériques au cours de la leishmaniose interne. [Variations in Serum Proteins in the Course of Kala Azar.]—*Bull. Soc. Path. Exot.* 1935. Dec. 11. Vol. 28. No. 10. pp. 922-929.

The authors have studied the blood serum of 12 human and 4 canine cases of kala azar from the point of view of the protein content at different stages of the disease. The conclusion reached is that during the first half of the disease there is a general increase in the total proteids

but a very variable decrease in the albumin, so that the albumin globulin ratio is lowered and often inverted. These modifications are frequently absent or even reversed at the commencement of the illness, while they disappear during the progress of cure resulting from antimony treatment. Though an estimation of the protein content of serum may give a useful indication of cure it cannot be regarded as a procedure of diagnostic value. C. M. W.

DI BENEDETTO (Vincenzo). La reazione di Henry (melano- e ferro-flocculazione) nella diagnosi della malaria e del kala-azar. [Henry's Reaction in the Diagnosis of Malaria and Kala Azar.]—*Riv. Sanitaria Siciliana*. 1935. July 15 & Aug. 1. Vol. 23. Nos. 14 & 15. pp. 1083-6, 1089-92, 1095-8; 1158-64, 1167-70, 1173-5. French summary (8 lines).

In this paper the author discusses at some length the reaction of Henry as an aid to the diagnosis of malaria and kala azar. As regards the former disease the test has been made in 150 cases, the results obtained being mostly positive and confirmatory of the claims of the originator of the test. Carried out in 50 cases of kala azar the results have also been almost uniformly positive, while they have been negative in 97 per cent. of 100 controls. The conclusion reached is that the reaction is of definite value for the diagnosis of malaria and kala azar. The explanation of the reaction is to be found in the physico-chemical changes in the blood rather than in the presence of specific antibodies. C. M. W.

GIRAUD (P.), CIAUDO & BERNARD (R.). Valeur de la réaction au peptonate de fer pour le diagnostic de la leishmaniose interne. [The Peptonate of Iron Reaction in Diagnosis of Kala Azar.]—*Bull. Soc. Path. Exot.* 1935. Nov. 13. Vol. 28. No. 9. pp. 811-817.

The authors have compared the peptonate of iron reaction with those of ureastibamine and formol and have found that the peptonate of iron, when used in a 1/320 solution, gives results which are equal in diagnostic value to those obtained with the other two reagents. Certain irregularities, however, occur, so that to obtain the best results the three tests should be applied. From the results obtained it is possible to state whether kala azar is probably present or not. C. M. W.

PITRUZZELLA (Rosolino). Ricerche sulla sieroreazione di Auricchio e Chieffi nella leishmaniosi viscerale. [Auricchio and Chieffi's Peptonate of Iron Reaction in Kala Azar.]—*Pediatrics*. 1936. Apr. 1. Vol. 44. No. 4. pp. 285-295.

The serum reaction referred to in the title is Auricchio and Chieffi's modification of the Henry malaria test, in which a solution (1/600) of peptonate of iron is allowed to run on to the surface of the serum to be tested. A positive result is shown by an opalescence developing into a definite flocculation. The author has carried out the test with the serum from 24 cases of infantile kala azar, 35 normal children and 46 suffering from other illnesses. Of the kala azar cases 15 gave a three plus positive reaction and these were cases which either had not commenced or were still undergoing treatment. One case gave a completely negative result, while in 8 the reaction was of a one or two plus intensity. The controls were uniformly negative.

CHORINE (V.) & PRUDHOMME (R. O.). Mécanisme de la réaction au peptonate de fer pour le kala-azar. [**Mode of Action of the Peptonate of Iron Reaction in Kala Azar.**—*C. R. Soc. Biol.* 1936. Vol. 121. No. 9. pp. 831-833.]

The authors discuss the Auricchio and Chieffi reaction and conclude that, as in the Henry reaction, it is due solely to the fact that the peptonate of iron increases the concentration of hydrogen ions in the mixture. Precisely the same results are obtained by the use of distilled water instead of peptonate of iron. C. M. W.

SARKISSIAN (A. B.). Zur früh-diagnose von Kala-azar nach dem Blutbild. —*Arb. d. Tropeninstituts d. Volksgesundh. Kommissariat d. SSR. Armenien.* 1935. Vol. 2. [In Russian pp. 343-344. German summary p. 371.]

MENON (T. Bhaskara), ANNAMALAI (D. R.) & KRISHNASWAMI (T. K.). The Value of the Aldehyde and Stiburea Tests in the Diagnosis of Kala-Azar.—*Jl. Trop. Med. & Hyg.* 1936. Apr. 15. Vol. 39. No. 8. pp. 92-95. [15 refs.]

It is concluded that the neostibamine test has the advantage over the aldehyde test in that it can be performed with the quantity of serum obtained from a finger prick and that it gives a positive reaction in a larger percentage of cases. On the other hand a number of positive reactions are given in cases other than kala azar. It is found that both tests are open to fallacies but that these can to some extent be overcome if both are performed together and it is remembered that weak reactions may be misleading. As regard the cases of kala azar tested it is stated that the diagnosis in most instances was a clinical one, as spleen puncture is not favoured by the Madras School of physicians. This being so it is open to question as to how accurate or otherwise are the figures brought forward for comparison. C. M. W.

BENHAMOU (Ed.) & GILLE (R.). La réaction de Chopra en dehors du kala-azar. [**Chopra's Reaction in Diseases other than Kala Azar.**—*C. R. Soc. Biol.* 1935. Vol. 120. No. 40. pp. 1261-1262.]

Contrary to the generally accepted view the authors have found that a positive ureastibamine reaction occurs quite commonly in malaria and some other diseases. It becomes positive when there is an increase in euglobulin, a diminution in the albumin and cholesterin and an increase in the flocculability. Quinine treatment of malarial cases causes a positive reaction to become negative. The reaction is in no way specific for kala azar. C. M. W.

VAN DEN BRANDEN (F.). Sur la réaction au formol-néostibosan et la réaction au sulfarsénol dans le diagnostic des infections leishmaniennes. [**The Formol-neostibosan and the Sulfarsenol Reactions in the Diagnosis of Leishmanial Infections.**—*Ann. Soc. Belge de Médecine Trop.* 1935. Dec. 31. Vol. 15. No. 4. pp. 569-571.]

In this report the author records his experience in applying the formol-neostibosan reaction of Nattan-Larrier and Grimard-Richard to the sera of 100 normal Europeans and 31 normal natives in the Belgian

Congo. The results were entirely negative except for a slight flocculation in four cases. Of three hamsters infected with leishmania only one gave a definitely positive result with the sulfarsenol test of Caminopetros. C. M. W.

ROUSLACROIX, CIAUDO & LUMBROSO. À propos des réactions sérologiques de la leishmaniose positives en dehors de celle-ci. [Positive Serological Reactions in Conditions other than Kala Azar.]—*Marseille-Méd.* 1936. Jan. 25. Vol. 78. No. 3. pp. 114-118.

A case of endocarditis due to a "strepto-enterococcus" and presenting features of Banti's disease, chronic malaria and kala azar, was positive according to the serological test employed for the diagnosis of kala azar. The case is brought forward as another instance of the lack of specificity of the serological reactions which indicate merely an involvement of the reticulo-endothelial system. C. M. W.

NATTAN-LARRIER (L.) & DUFOUR (J.). Localisation des Leishmanias dans les épithéliums des canaux biliaires normaux et cancéreux. [Leishmania in Normal and Cancerous Cells of the Bile Ducts.]—*C. R. Soc. Biol.* 1936. Vol. 121. No. 1. pp. 13-17. With 2 figs.

In hamsters infected with *Leishmania donovani* the parasites may occur in the epithelial cells lining the bile tubules. In an animal suffering from epithelioma the parasites were also seen in the epithelium lining the alveoli which had developed from the bile tubules. In the tumour itself cells which had become definitely cancerous were less liable to infection than other cells which retained their normal tropism for the parasite. Macrophages in the tumour, as in normal tissue, were infected. C. M. W.

MO TEN SEI. Pathologie-Anatomical and Pathologie-Histological Studies of Kala-Azar.—*Jl. Oriental Med.* 1936. Feb. Vol. 24. No. 2. [In Japanese pp. 243-269. With 10 figs. on 2 plates. [35 refs.] English summary pp. 15-16.]

The study of tissues from 5 fatal cases of kala azar in Manchoukuo has shown that the histological changes are similar to those described for this disease in other endemic foci. C. M. W.

CHODUKIN (N. I.), SOFIEV (M. S.) & KEVORKOV (N. P.). [The Identification of Various Strains of Leishmania.]—*Trans. Inst. Epidemiol. & Microbiol.* Tashkent. 1935. Vol. 2. pp. 65-111. [In Russian.]

Working with various strains of *Leishmania* [human and canine *L. donovani* and *L. tropica* of local (Middle Asia) origin; *L. infantum* (Tunis), *L. donovani* (India), *L. tropica* (Baghdad) and *L. brasiliensis*] the authors applied the following methods, with the object of testing their relative value for the differential diagnosis of these strains:—

(1) Fermentation of sugars in cultures; (2) agglutination; (3) Castellani's method of absorption of agglutinins; (4) Negri's method (lytic sera); (5) complement fixation; (6) cultivation on Papanicolaou solid medium (appearance of colonies).

None of these methods proved to be suitable for specific differentiation, all of them producing group-reactions, which include both the human and canine strains. The failure to differentiate the leishmaniasis by the adhesion reaction has been previously recorded by these authors.

C. A. Hoare.

SHEVTCHENKO (F. I.) & RADZIVILOVSKY (G. L.). [**Canine Leishmaniasis in the Tashkent Breeding Kennels.**]—*Trans. Inst. Epidemiol. & Microbiol.* Tashkent. 1934. Vol. 1. pp. 146-149. [In Russian.]

The authors give an account of the incidence of leishmaniasis among dogs in the Tashkent breeding kennels. Both the visceral and cutaneous forms occurred, while in a number of cases a transition from a localized to a generalized infection took place. These are cited in evidence of the identity of the parasites responsible for both conditions.

C. A. Hoare.

SOFIEV (M. S.) & SHEVTCHENKO (F. I.). [**On the Identity of the Causative Agents of Cutaneous and Visceral Canine Leishmaniasis.**]—*Trans. Inst. Epidemiol. & Microbiol.* Tashkent. 1934. Vol. 1. pp. 150-153. [In Russian.]

An analysis of previous records of cutaneous leishmaniasis in dogs has led the authors to doubt its independent nature, and to regard this condition as a manifestation of generalized leishmaniasis.

Support was lent to this view by observations on a number of cases of canine leishmaniasis in Tashkent. In one of these a skin lesion containing the parasites was found. Eight months after successful treatment of the sore the dog developed all the symptoms of visceral leishmaniasis, also confirmed microscopically. In another case a dog suffering from typical visceral leishmaniasis developed cutaneous sores after treatment, and after these had also been cured a relapse of the generalized infection occurred. It is concluded that cutaneous leishmaniasis in dogs represents one of the manifestations of generalized leishmaniasis: that the disease, having started with a localized lesion may become generalized, and that, *vice versa*, recovery from a generalized infection may lead to the appearance of localized lesions.

It is assumed that both conditions are due to a variation in the virulence of the same causative organism.

C. A. Hoare.

LESTOQUARD (F.) & DONATIEN. Un cas autochtone de leishmaniose générale du chien à Toulouse. [**Autochthonous Leishmaniasis in a Dog in Toulouse.**]—*Bull. Soc. Path. Exot.* 1935. Dec. 11. Vol. 28. No. 10. pp. 921-922.

During a stay in Toulouse the authors took the opportunity of examining ~~int~~ leishmania dogs which were destroyed in the pound. Amongst ~~posit~~ examined there no case of infection was found. Their ~~atten~~ ^{orient} however, was called to an Irish terrier belonging to the ~~mu~~ ^{not} appog catcher. It was in good condition but had ulcers about the ~~th~~ ^{front} front feet. Examination of scrapings from the ulcers as

also of smears of bone marrow obtained by tibial trephine, revealed leishmania. The dog had spent the whole of its life in the town so that the case was evidently one of autochthonous infection. No other case of infection so far from the Mediterranean coast, where human and canine kala azar is common, has been noted. The case forms a connecting link between the Mediterranean endemic centre and those of the Iberian Peninsula. C. M. W.

MARCHESI (F.), CRAINZ (F.) & SCAPATICCI (R.). Ricerche sulle variazioni stagionali della leishmaniosi dei cani in Roma. [**Investigations on the Seasonal Variations of Canine Leishmaniasis in Rome.**—*Arch. Ital. Sci. Med. Colon.* 1935. Nov. Vol. 16. No. 11. pp. 805-812.

This paper appears to be an Italian version of one already published in the *Journal of Tropical Medicine* in English (see this *Bulletin*, ante, p. 18). C. M. W.

LÉPINE (P.) & BILFINGER (F.). Recherche de la leishmaniose viscérale chez les chiens de fourrière d'Athènes. [**Leishmaniasis among Dogs in the Pound at Athens.**—*Bull. Soc. Path. Exot.* 1936. Feb. 12. Vol. 29. No. 2. pp. 131-135.

The authors have examined for evidence of leishmania infection 498 stray dogs destroyed at the pound in Athens. Smears of the liver, spleen and bone marrow were searched for parasites in all cases, while in 222 cultures were attempted from the blood or spleen. The result was that 55 cases of canine kala azar were discovered. Parasites were found 50 times in the bone marrow taken from the sternal end of a rib, 42 times in the spleen and 21 times in the liver. Of the cultures 21 were positive and of these two were from cases which had not shown parasites in the smears. Various serological tests were carried out with the blood of the dogs. In the known cases of kala azar the reactions were positive, while positive results were obtained also in a number of cases in which leishmania had not been found. If these are to be regarded as cases of latent infection the percentage of infections would be raised from 11.2 to 15.8. It is doubtful, however, if such a conclusion is justifiable. C. M. W.

POURSINES (Y.), SOULIE (P.) & SCANDARANI (Toufic). Enquête sur la leishmaniose canine à Beyrouth. [**Canine Leishmaniasis in Beirut.**—*Jl. Egyptian Med. Assoc.* 1935. Dec. Vol. 18. No. 12. pp. 773-782.

An examination of 46 dogs in Beirut has revealed a visceral leishmania infection in three. It is noteworthy that the three dogs were pedigree dogs, two of which had been imported from France and that they came from the centre of the European quarter. Of the 43 found to have no infection 30 were stray dogs destroyed by the municipal authorities.

GIRAUD (Paul), CIAUDO (P.) & BERNARD (R.). Sur la date d'apparition des réactions sérologiques dans la leishmaniose canine expérimentale. [Time of Appearance of Serum Reactions in Experimental Canine Leishmaniasis.]—*C. R. Soc. Biol.* 1935. Vol. 120. No. 40. pp. 1250-1252.

Observations on the changes in the serum of two dogs experimentally infected with kala azar indicated that these do not become evident till after the expiry of 3 to 6 months from the date of inoculation. The albumin-globulin ratio reveals at first an increase but this diminishes as the disease progresses. Similarly the formol, ureastibamine, sulfarsenol and peptonate of iron reactions became evident after a similar interval and gradually increased in intensity. The ureastibamine and the peptonate of iron reactions were equally reliable, while the formol reaction was slightly less so. The sulfarsenol reaction gave most variable and unreliable results. C. M. W.

HUMPHREYS (R. M.) & MAYNE (F. S.). Oral Leishmaniasis in the Anglo-Egyptian Sudan.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. Nov. 25. Vol. 29. No. 3. pp. 285-288. With 3 figs. on 1 plate.

The paper describes 3 cases, one British and 2 native, of oral leishmaniasis. In one case there were lobulated growths on the hard palate, whole of the soft palate, the tonsils, inner side of gums of upper jaw, and mucosa of the nasopharynx and nares. The liver and spleen were enlarged. Leishmania were discovered in material obtained by puncturing the growths but not in that from the spleen. The British case commenced as purple patches on the gums. The condition developed steadily for 7 years till, when seen by one of the authors, the floor of the mouth, palate, gums and inner aspect of the cheeks had the appearance of granulation tissue with small ulcers. Smears from a freshly excised portion of the gums showed leishmania. In the third case there was a flat papillomatous growth on the floor of the mouth extending to the lower jaw and on to the buccal mucous membrane. The liver and spleen were both much enlarged. Spleen puncture failed to reveal leishmania which were present in the oral growth. The cases were treated with intravenous injections of tartar emetic or neostibosan. All three cases responded well to treatment, though it was necessary to give larger doses and to continue the treatment over a longer period than is necessary for kala azar. C. M. W.

KOUSA. Contribution au traitement du bouton d'Alep. [On the Treatment of Oriental Sore in Aleppo.]—*Jl. Egyptian Med. Assoc.* 1935. Aug. Vol. 18. No. 8. pp. 564-569.

The paper reviews the work of the special clinic devoted to oriental sore in Aleppo. Numerous methods of treatment have been employed but at present three are chiefly used. These are the cryocautery, valuable because of the rapidity of its application; dressing, after curetting, with a compress soaked in a 25 per cent. solution of iron perchloride; and, finally, intravenous injections of foudadin, used when the sores are in such a position that they cannot be dealt with by the other methods. Though oriental sore is very common in Aleppo visceral leishmania does not appear to exist as numerous spleen punctures performed in different hospitals have failed to demonstrate the parasite. C. M. W.

SHATTUCK (George Cheever). **The Distribution of American Leishmaniasis in Relation to that of *Phlebotomus*.**—*Amer. Jl. Trop. Med.* 1936. Mar. Vol. 16. No. 2. pp. 187-205. [56 refs.]

This is a very interesting review of the records of American leishmaniasis in various localities, written with special reference to a possible correlation between the distribution of the disease and that of sandflies of the genus *Phlebotomus*. Though the records regarding the sandflies are far from complete it appears that a definite correlation actually exists and it seems probable that all forms of leishmaniasis are transmitted usually by species of *Phlebotomus*. It is possible, however, that the disease may occasionally be transmitted by other vectors and even by direct or indirect contact. It is clear that much more work has to be done on the method of transmission of leishmaniasis in America and the paper under review affords an excellent introduction to the subject.

C. M. W.

BLACKWATER FEVER.

FOY (Henry) & KONDI (Athena). *Researches on Blackwater Fever in Greece*. I.—Introduction and History. II.—A Note on the Action of Ehrlich's Diase-Reagent on the Unhaemolyzed Serum of the Rabbit. III.—A New Photo-Nephelometric Method for the Quantitative Estimation of Minute Amounts of Quinine in Faeces and Body Fluids.—*Ann. Trop. Med. & Parasit.* 1935. Oct. 5 & Dec. 18. Vol. 29. Nos. 3 & 4. pp. 383-393. [37 refs.]; 395-397. [15 refs.]; 497-515. With 2 graphs & 2 diagrams. [29 refs.]

I. The researches which will form the basis of this series of papers being undertaken under the aegis of the Health Organisation of the League of Nations.

The first paper deals with the history of blackwater fever in Greece. A certain amount of confusion exists as to the precise interpretation of the Hippocratic cases. Careful examination of the Hippocratic corpus in Greek, and of numerous translated texts has led the authors to the opinion that if the cases described by Hippocrates were not blackwater fever, then it is very hard to say what they were. It is believed that this is the first attempt to analyse critically the Hippocratic texts with regard to these blackwater fever cases.*

At the present time there appear to be four more or less ill-defined types of haemoglobinuria occurring in Greece, some of which can hardly be regarded as falling into the category of blackwater fever, as at present understood. One type is the so-called malaria haemoglobinuria (with or without quinine); another is produced by eating beans, *Fava vulgaris*, a third group consists of quinine-sensitive individuals; and lastly there is a certain number of cases of Weil's disease. Clinically, the first three are indistinguishable from one another, and the fourth can only be diagnosed by laboratory methods rarely resorted to in Greece.

Whether these various types of haemoglobinuria were existent when Hippocrates wrote in 450 B.C. is impossible to say, though it is highly improbable that the Greeks were familiar with quinine. The fact that the Greeks were unfamiliar with quinine is, however, hardly an argument against regarding the Hippocratic cases as blackwater.

The authors give a number of representative Hippocratic cases freely translated into English either from the Greek, the German, or the French, and checked against the already existing English texts. They remark that it will be seen that the various cases exhibited such characteristic symptoms of blackwater fever as black or red urine, icterus, enlarged spleen, vomiting, anuria, uraemia, and fever. They then pass to a consideration of subsequent references to the disease in Greek literature. From 450 B.C. until late Byzantine times no reference which could be regarded as relating to blackwater fever is traceable.

*[The term "black urine" (μέλαινα ούρα) used in the first book of Hippocrates' *Epidemics* is, of course, very indefinite, and the modern term αιμοσφαινουρικός πυρετός or haemoglobinuric fever (αιμοσφαιρίνη = haemoglobin) was naturally not known before the microscope could differentiate haemoglobinuria from haematuria.

πυρετός might mean any form of fever, but from Aristophanes' time onwards it was applied to the prevalent fever, malaria, and was not used of certain other fevers, plague for example.—Ed.]

In the seventh century A.D., however, Theophilus Protospatharios mentions black urine; and in the twelfth century A.D., Actuarius refers to black urine accompanied by fever and icterus. From this period until the middle of the nineteenth century no statements are traceable in Greek that may be regarded as referring to blackwater fever.

In 1842 Mavroyanis writes that "one form of malignant intermittent fever is that which affects the bowels, *viz.*, the bloody or black-bile fever," but whether this is meant to apply to haemoglobinuria seems doubtful.

The first undoubted reference to blackwater fever in Greece by a Greek author was in 1858, when Antoniades mentions that a number of Greek doctors have observed that haematuria (haemoglobinuria) is a common symptom of the intermittent fever and follows the administration of quinine.

II. Experiments were performed on the unhaemolysed serum of a rabbit, with the object of ascertaining the bilirubin level as a guide to the reticulo-endothelial blockade. The authors used the original van den Bergh reaction, and also that of Thannhauser and Andersen.

Contrary to the work of LEPEHNE (1919) it was found that the serum of normal rabbits contains no bilirubin that reacts with the diazo-reagent of Ehrlich, thus confirming Hida, Yamanaka and Maeda. How far this is due to smaller amounts present in the serum of rabbits, or to differences in the renal thresholds for this substance, or to factors connected with the reticulo-endothelial system, it is impossible to say.

III. These studies were undertaken in an attempt to throw some light on the action of quinine in blackwater fever after blockade of the reticulo-endothelium with thorotrast or electro-colloidal copper (Heyden); on the relation of this blockade to the effectiveness of quinine in clearing the blood of malaria parasites; and on the question whether blockade has any effect upon the blood levels and upon the rate of excretion of quinine.

Before any of these problems could be attacked it was necessary to develop some practical means of estimating quinine in blood and urine and if possible in faeces. It also seemed desirable to use some method for ascertaining to what extent the blockade of the reticulo-endothelial system had become effective, as otherwise it would be impossible to draw conclusions. Work is progressing on the latter problem and will be recorded later; the object of the present paper is to call attention to what the authors believe to be a new method for estimating minute amounts of quinine in 1 cc. of urine (which can also be made applicable to faeces), and to certain improvements which they have introduced into the methods for blood quinine.

Since RAMSDEN and LIPKIN (1918) described their laborious methods for blood and urine quinine estimation, little or no real advance has been made in the study of blood quinine levels and their correlation with the excretion of the alkaloid by the renal and alimentary routes. ACTON and KING (1921) modified RAMSDEN and LIPKIN's method and reduced the time and labour necessary to make the estimations, but still left much to be desired, both as to practicability and sensitivity. ROY (1926) increased the sensitiveness of the colorimetric methods by introducing a modified Wagner's reagent indicator for blood quinine; and later VEDDER and MASEN (1931) still further improved the colorimetric method by introducing gum-ghatti and a potassium bismuth iodide indicator, claiming that the gum-ghatti stabilized the colour of

their indicator, and that with this indicator the large number of standards necessary for use with Roy's reagent were unnecessary. The authors, however, reached the conclusion that the instability of the colour in both these colorimetric methods renders them worthless. In view of this they decided to modify VEDDER and MASEN's (1931) nephelometric method for blood quinine.

The sensitivity and accuracy of the method developed by the authors for the estimation of quinine in urine is, as is shown from their results, all that can be desired. It is impossible in a summary of moderate length to describe the authors' method in an adequate manner and the paper must be consulted in the original by those interested.

The following summary is given by the authors :—

" 1. A new photo-nephelometric method is described for the quantitative estimation of minute amounts of quinine in faeces and body fluids, which is accurate and sensitive to 0.5 mg. per litre.

" 2. The use of a new photo-nephelometer, for use with a standardized turbidity prism, is briefly described.

" 3. Variations in the amount of quinine excreted in the urine after similar doses are noted.

" 4. Large quantities of quinine were found to be frequently excreted in the faeces.

" 5. The discrepancy between the amount of quinine absorbed, as shown by the urine level and blood quinine level, is noted."

W. Yorke.

REYNTJENS. La fièvre bilieuse hémoglobinurique et l'enfance noire. [**Blackwater Fever and the Black Child.**]—*Bull. Méd. du Katanga*. 1935. Vol. 12. No. 4. pp. 141, 143–147.

Under normal conditions the black child, especially during its first year of life, escapes blackwater fever, although it frequently dies of malaria. When, however, it is protected against the effects of malaria by quininization it becomes susceptible to blackwater. This is illustrated by two cases which came under the author's observation.

The first case was that of a Baluba (Kasongo) child born on 25th August, 1934. It was a splendid specimen and doubled its weight in 3 months. It was taken twice weekly to the clinic and given 0.13 gm. of quinine at each visit. The child remained apparently quite well until 1st April, 1935, when 72 hours after the last dose of quinine, and after a cold and wet journey, it was brought to hospital in a comatose state; the blood contained malaria parasites and the urine haemoglobin. Death supervened within 12 hours.

The second case was that of a Babemba (Fort Rosebery) child born on 4th August, 1934. It was healthy and doubled its weight in 2½ months. It was given 0.13 gm. of quinine twice weekly, except during the 4th and 5th months. On 1st April, 1935, it developed haematuria [*sic*], although it had not taken quinine during the previous 6 days. On admission to hospital the blood contained many parasites and the temperature was 39.3°C. Atebrin and plasmoquine were given and the cure was rapid. On 3rd June there was a relapse, the blood containing numerous gametes. Quinine 0.25 gm. and plasmoquine were given, and 2 hours later haemoglobin appeared in the urine and death occurred 6 hours later.

The author draws attention to the fact that these two patients developed blackwater fever on the same day, *viz.*, 1st April, 1935, and that on the 3rd June when the second case relapsed a young man was.

also admitted to hospital with the disease. He points out that these days were particularly cold, and that the 31st of March and 1st of April were also very wet. The two children were regularly quininized since birth, but notwithstanding their growth the dose remained constant at 0.13 gm. twice weekly.

W. Y.

CHESTERMAN (Clement C.). Blackwater Fever in a Negro Child.—*Lancet*. 1935. Sept. 7. p. 554.

In a hyperendemic malarial region, such as the Central Congo Forest, native children either die of malaria or reach a condition of tolerance in which there is a relative freedom from febrile attacks, although parasites are still present in the blood, and an immunity from blackwater fever. Among natives who have acquired tolerance to malaria from childhood blackwater fever is practically unknown, but recently evidence has been obtained that under certain conditions this protection may break down. An illustration of this is given. The patient was a full-blooded negro child aged 2½ years. For the first 18 months of life he attended the infant welfare clinic at Yakusu Hospital and was given routine weekly doses of quinine HCl varying from 0.04 gm. to 0.1 gm. On 5th February, 1935, after two days fever, he was brought to hospital and given 0.08 gm. of quinine; next day he had haemoglobinuria: the blood showed pigmented monocytes, but no parasites. The condition quickly resolved, but a week later scanty *P. falciparum* were found in the blood. Another dose of 0.08 gm. quinine was given without untoward result.

The mortality among the clinic babies is less than 150 per 1,000 and this is attributed to the regular weekly dose of quinine. During the last 10 years over 1,000 babies have attended the clinic and the case recorded is the only instance of haemoglobinuria observed.

Reference is made to the fact that LECLEF and DE DECKER [this *Bulletin*, 1932, Vol. 29, pp. 664–5] from the Katanga Copper Mines have reported 28 cases of blackwater with 3 deaths among natives who come from malaria regions. These cases were attributed to the unaccustomed dosing with quinine and to the predisposing causes of debility among bush natives working in industrial conditions.

W. Y.

JACKSON (Stanley). A Case of Blackwater Fever in an Infant, a Native of Nigeria.—*Jl. Trop. Med. & Hyg.* 1935. Nov. 15. Vol. 38. No. 22. p. 284.

A fatal case of blackwater is described in a native infant at Hospital, Plateau Province, Northern Nigeria.

The child was 16 months old and had had 3 previous attacks of fever. On admission the temperature was 102°F., the liver and spleen were enlarged, the skin was icteric, and the blood contained numerous *P. falciparum*. Quinine was given and blackwater fever supervened from which the child died.

W. Y.

GORDON (R. M.) & DAVEY (T. H.). The Association of Bacteriuria with Blackwater Fever in West Africa.—*Ann. Trop. Med. & Parasit.* 1935. Dec. 18. Vol. 29. No. 4. pp. 439–456. [13 refs.]

During recent years an extensive literature has accumulated regarding various possible factors in the aetiology of blackwater fever, but whereas publications on the biochemical changes in this disease

have steadily increased, references to bacteriological investigations have diminished. This is probably due to the fact that there appears to be a steadily increasing consensus of opinion that blackwater fever is not due to a specific organism in addition to the malaria parasite. In the comparatively few instances in which blood cultures have been carried out, the majority proved sterile. STEPHENS and CHRISTOPHERS (1900), however, recorded the presence of staphylococcus in heart and liver cultures made at an autopsy in a case of blackwater fever, and CRICHLLOW (1929) referred to the occurrence of staphylococcus-like organisms in the blood. Practically no bacteriological data are available regarding the urine in blackwater fever.

The authors' attention was first drawn to the presence of bacteria in the urine of blackwater fever patients in 1924, when, for the purpose of making certain observations on haemolysis, they wished to carry out experiments with sterile blackwater urine. Specimens of urine were obtained aseptically from a case of blackwater fever, but on each occasion staphylococci were present. Under the impression that the organism was probably a contamination from the air or skin, a catheter specimen was taken with all possible precautions. This also yielded a pure culture of staphylococcus.

This paper records the results of the examination of as many active and recovered cases of blackwater fever as have been recently encountered. Specimens were taken with proper aseptic precautions from 7 cases during, or within a few days of, the haemolysis. Cultures were also made from the urines of 13 recovered patients, 12 of whom contracted their blackwater fever in West Africa, and most of whom gave a history of several years' freedom from the disease prior to the examination. For the purpose of control the urine of 20 Europeans, who had been in Sierra Leone for two years or more, were examined and also those of 24 West African natives; none of the controls was under treatment for any genito-urinary infection. No anaerobic cultures were carried out, although the authors are of opinion that this line of investigation might yield interesting results.

The method adopted for obtaining specimens of urine from the male as aseptically as possible was as follows:—

"The glans and meatus were carefully washed up with sterile soap and water, followed by a wash with absolute alcohol, and, having discarded the first flow of urine, specimens were collected directly into two or more broth tubes. We are of the opinion that this method is generally more satisfactory than the passing of a catheter, and it was usually adopted; but in the case of females, natives and some patients in the active stage of blackwater, it was found necessary to pass a catheter after the preliminary washing-up just described. At the beginning of this investigation, primary cultures were obtained by taking samples of about 5 c.cm. urine into 20 c.cm. liver broth; but later, nutrient broth was substituted, as it was found that the majority of the various organisms grew with equal regularity on this medium. The centrifuged deposit was never employed for cultural investigation. The broth and urine mixture was kept at 37°C. for four days, at the end of which time, if no growth was observed, sterility was confirmed by plating on nutrient agar. The usual bacteriological technique was followed for the isolation and identification of the organisms, and the results obtained are recorded in the Appendix."

The authors give the following summary and conclusion of their work:—

"In 7 cases of blackwater fever examined during the active stage of the disease all 7 were found to be excreting organisms in their urine. Amongst

so small a series of cases, such an association may, of course, be merely a coincidence; we cannot, however, dismiss it as such, until a case of active blackwater fever is encountered in whose urine no organisms are to be found. We have not observed such a case in Sierra Leone, and the one case examined for us in England was also associated with a bacteriuria.

"In 13 recovered cases, examined at various periods from one month to ten years after the attack, 12 were found to have bacteria in their urine, while in one, examined two years after the attack, no bacteria were found on culture.

"Amongst 44 European and African controls, examined by the same technique, 34 were found to be similarly excreting organisms. The incidence of bacteriuria, therefore, amongst the active and recovered blackwater cases was higher than amongst the controls, 95 per cent. as compared with 77 per cent.

"In the small series of active and recovered blackwater cases in which quantitative estimations were made, the concentration of bacteria was generally found to be higher than amongst the control cases.

"A comparison of organisms of the same genera, *i.e.*, staphylococci or streptococci, isolated from active and recovered blackwater cases and from control cases, showed no essential differences in morphological, cultural or biochemical characters.

"We have been unable to produce any evidence that bacteria isolated from the urines of active and recovered blackwater cases, or from control cases, show any marked pathogenicity.

"Although it has thus been shown that blackwater fever is constantly associated with bacteriuria in the series of cases examined by us, and that the concentration of bacteria is usually high, yet, since we have been unable to demonstrate any marked pathogenicity in the organisms isolated, and since controls show that bacteriuria is widespread amongst Europeans and Africans in Sierra Leone, it follows that its mere presence in cases of blackwater fever cannot be regarded as evidence that it bears any causal relationship to the disease. Further, the results obtained prove that a combination of chronic malaria undergoing treatment with quinine and associated with bacteriuria does not necessarily result in blackwater fever, for several of our European control cases presented this combination, although in these cases the concentration of bacteria was low. In addition, some of the controls, who at the time of examination were similarly excreting a small number of bacteria in their urine but were not suffering from malaria, subsequently contracted malaria without developing haemoglobinuria.

"The remarkably high bacterial concentration which we have recorded in some of our active and recovered blackwater cases is the only feature which we have not observed in the series of control cases. Whether the high bacterial concentration in the urine in these cases was a mere coincidence, or whether it played any part in the causation of the disease, cannot be determined without examining a larger number of cases." W. Y.

BENSIS (W.) & GOUTTAS (A.). Bileuse hémoglobinurique grave au cours d'un paludisme secondaire en activité, avec anurie déclenchée manifestement par traitement quininique. Trêve paludéenne pendant l'étape anurique. Reprise d'activité paludéenne après rétablissement de la diurèse. Rechute hémoglobinurique après reprise du traitement quininique progressif. Nouvelle poussée paludéenne finalement jugulée par l'atébriane. Guérison définitive, [A Case of Blackwater Fever with Clinical Details.]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1935. Nov. 25. 51st Year. 3rd Ser. No. 29. pp. 1525-1529.

This describes in detail the clinical course of a patient suffering from malaria who developed blackwater fever. The patient became anuric, but the flow of urine gradually returned; parasites persisted in the

blood, and after a few days there was an increase in number accompanied by a malarial paroxysm. Quinine was given, and this was followed by a recrudescence of haemoglobinuria. Some days later, after the haemoglobinuria had disappeared, there was another attack of malaria. This was treated by atebirin and plasmoquine, and the patient recovered. W. Y.

SEATON (S. P.). **Blackwater Fever in Hainan.**—*Chinese Med. Jl.* 1935. Aug. Vol. 49. No. 8. pp. 792-796.

Blackwater fever is comparatively rare in China, only occurring in Formosa, Yunnan and Hainan, although occasionally a case is recorded from the Southern ports. Since 1932 several cases have come each year to the Mary Henry Hospital, Nodua, Hainan Island. They have all come from the market town of Namfong, 8 miles from Nodon, and from its neighbouring village of Lokaga.

Histories are given of 7 patients belonging to two families. W. Y.

KRISHNAN (K. V.) & PAI (N. G.). **The Aetiology of Blackwater Fever.**—*Indian Med. Gaz.* 1936. Mar. Vol. 71. No. 3. pp. 121-127. [25 refs.]

This paper is in itself a review and contains nothing new. The author summarizes his argument as follows:—

"Blackwater fever is not an independent disease but a manifestation of malaria. In its causation probably a special 'biological strain' of the malarial parasite is concerned. This strain is important not by virtue of its toxinogenic property but rather on account of its distinct biochemical activity. The peculiar mode of attack of the parasite on the host, for purposes of obtaining its food requirements, probably leads indirectly to the production of haemolysis and haemoglobinuria. This assumption recognizes the prime importance of the host factor not only in inducing this 'biological' variation in the parasite but also in producing the predisposition to haemolysis and haemoglobinuria. The two most important predisposing factors are a damaged reticulo-endothelial system and a diminution in free cholesterol involving both the red cells and the plasma, the latter determining the extent of haemolysis and the former the degree of haemoglobinuria. The sudden severe intravascular haemolysis is explained not merely on the basis of physical alterations but rather by the presence of a haemolysin. It is suggested that this haemolysin is the end result of a damaged liver and alterations in metabolism of both carbohydrates and fats, and that possibly it is of the nature of an unsaturated fatty acid or a lyso-lecithin." W. Y.

- i. KUBO (M.). **Experimental Research into the Etiology of Blackwater Fever. On the Combined Action of the Products of Erythrololysis and of Quinine as a Causative Factor of Haemoglobinuria.**—*Taiwan. Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1935. Sept. Vol. 34. No. 9 (366). [In Japanese pp. 1438-1510. With 17 charts. [67 refs.]. English summary p. 1511.]
- ii. ——. **Experimental Research into the Action of Glucose as an Inhibitory Agent in Quinine Haemolysis.**—*Ibid.* Oct. No. 10 (367). [In Japanese pp. 1749-1764. [11 refs.]. English summary p. 1765.]

i. This paper describes experimental work undertaken with the object of elucidating the part played by quinine in the production of blackwater. A 10 per cent. solution of rabbit red cells was prepared in distilled water, and the solution was then made isotonic by the addition of

sodium chloride. Isotonic solutions of quinine hydrochloride containing, respectively, 8 per cent., 6 per cent., 4 per cent. and 2 per cent. of quinine HCl were likewise prepared. The laked red cell solution was injected into the marginal ear of a rabbit in a dose of 4 cc. per kilo of body weight, and at the same time 1 cc. per kilo of one of the quinine solutions was injected into the portal vein.

When the concentration of the quinine solution was 6 or 8 per cent. the amount of haemoglobin excreted in the urine markedly exceeded the amount injected, but this was not the case with the lower concentrations of quinine. If the reticulo-endothelial system was blocked the amount of haemoglobinuria was still further increased.

It is concluded that the genesis of blackwater is as follows :—

Malaria causes a breakdown of erythrocytes in the blood and the products of disintegration lead to a further destruction of red cells on administration of quinine. The process is aided by the fact that the melanin and haemosiderin associated with malaria are deposited in the reticulo-endothelium and cause a paralysis and blockade of the functions of this system. [Even if the experimental facts described above are correct it is very doubtful if the explanation of the production of blackwater is adequate. There is no evidence that the reticulo-endothelial system is paralysed by the chronic malaria which habitually precedes blackwater : all the evidence points in the other direction, *viz.*, that it is in a state of proliferation and hyperactivity.]

ii. Experiments were undertaken to investigate the basis of the reputed beneficial effect of the intravenous injections of glucose solutions in blackwater fever.

The author repeated the *in vitro* experiments of Kondo and was able to confirm that glucose possesses the power of inhibitory action on the haemolysis of red cells by quinine. He then extended his investigations to animal experiments and was able to show that the injection of 10 cc. of a 5.4 per cent. solution of glucose per kilo. of body weight caused a diminution in the amount of haemoglobinuria produced by experiments of the kind described in the previous paper.

From this it is concluded that the efficacy of glucose as a therapeutic agent in blackwater depends upon the fact that it has an inhibitory action on the haemolysis of red cells by quinine. W. Y.

BUDELMANN (G.) & KRAUEL (G.). Zur Frage der paradoxen Chininwirkung. [The Question of the Paradoxical Action of Quinine.]—*Klin. Woch.* 1936. Feb. 15. Vol. 15. No. 7. pp. 225–227. With 2 figs. [18 refs.]

Quinine usually causes a fall in temperature and this is specially marked in pyrexial cases. The fall is supposed to be due to a lowering of the chemical energy of the protoplasm of all cells. Occasionally, however, the administration of quinine is followed by an increase of temperature, and the cause of this paradox is unknown.

Details are given of a patient (mitral stenosis and hyperthyroidism) in whom the administration of chinidin was attended by a rise of temperature two hours later. Altogether the patient was given 4 doses, each of 0.1 gm., of chinidin, and on each occasion there was a rise of temperature to 40°C. and a rigor. It is recorded that v. MÜLLER obtained this paradoxical reaction in two cases of Basedow's disease.

It occurred to the authors that the rise of temperature might be due to a haemolytic action of the chinidin, and accordingly they sought for evidence of this. No trace of haemoglobin was, however, found in the

urine. Attempts were then made to produce evidence of quinine haemolysis through investigations of the patient's serum; the red cells of the patient showed a perfectly normal resistance to hypotonic saline. Experiments were performed with the aid of a Pulfrich's refractometer. Immediately after mixing quinine 0.4 gm., normal saline 10.0 gm., and whole blood 60 cc., the refractometer value was 54; two hours later it had risen to 59.5, and the serum was deeply stained with haemoglobin. Observations were next made on the patient himself before and at various intervals after the administration of 0.1 gm. of chinidin. Before the administration of the drug the refractometer value was 52, and afterwards it rose to 56; the temperature rose from 36°C. to 39.5°C. The rise in the refractometer value preceded the rise of temperature.

The authors are of opinion that they have produced some evidence that the rise of temperature which occasionally follows the administration of quinine is due to a quinine haemolysis. W. Y.

CHOPRA (R. N.), SEN (B.) & BHATTACHARYA (S. N.). **A Case of Quinine Haemoglobinuria.**—*Indian Med. Gaz.* 1935. Aug. Vol. 70. No. 8. pp. 453-454.

The patient, a girl of 11, was admitted to hospital with a history of repeated attacks of malaria and occasional attacks of blackwater. The patient was anaemic, the spleen and liver were enlarged, but there was no fever. Six weeks before admission she had an attack of blackwater 4 hours after a dose of quinine. Three weeks later she again had an attack of malaria, and although no quinine was given she passed black-coloured urine; this lasted for a week and then subsided. The girl was then sent to hospital for investigation and treatment. Microscopic examinations of the blood and faeces were negative; the urine contained no haemoglobin, but gave a definite urobilin reaction. Other examinations of the blood showed (a) increased fragility of the red cells, (b) reduction in the electric charge of the corpuscles, (c) diminution in serum albumen, but increase in the euglobulin, pseudoglobulin, cholesterol and calcium contents.

In order to see whether quinine had any effect in bringing about haemoglobinuria, 6 grains in two equal doses were given by the mouth on 16th January. Blackwater was passed shortly afterwards, but was not accompanied by fever or general symptoms. On 30th January three doses of atebirin, each of 0.1 gm., were given, and on 1st February the same dose of atebirin with 0.0099 gm. of plasmoquine. The urine remained normal. On 5th February 6 grains of quinine failed to produce blackwater, but on 10th February 3 doses of quinine, each of 3 grains, were followed by a short attack of haemoglobinuria. W. Y.

BJØRN-HANSEN (Haakon). Ueber die paroxysmale Kälte-hämoglobinurie. Mit besonderm Hinblick auf die leukozytären Blutveränderungen, die Hämolyse und den Blutdruck im Anschluss an experimentelle Abkühlungsversuche. [**Paroxysmal Haemoglobinuria. With Special Reference to the Leucocyte Changes, the Haemolysis, and the Blood Pressure in the Course of Experimental Cooling Experiments.**]—*Acta Med. Scandinavica.* 1936. Vol. 88. No. 2-4. pp. 129-179. With 6 charts & 2 figs. [51 refs.]

Four patients suffering from paroxysmal haemoglobinuria were studied in considerable detail during attacks produced experimentally by cooling.

All patients exhibited a leucopenia within 10 to 15 minutes; this was independent of any general paroxysm or of the passage of haemoglobinuria. The lowest leucocyte count, *e.g.*, a fall from 10,000 to 2,100 or from 10,100 to 6,500, was observed about 20 minutes after the commencement of the cooling; the leucopenia lasted some hours or only 20 to 30 minutes, and then the number of leucocytes rose and returned to normal or even rose beyond this value. Sometimes the leucocyte formula was unchanged and at others there was a relative neutropenia. Often there was a shift of the Arneth count to the left. In some experiments the eosinophil leucocytes disappeared completely from the blood. The leucocytosis which sometimes followed the leucopenia was due to an increase in the neutrophils, which in part consisted of young cells.

When a tourniquet was applied to the arm and the limb cooled at 3°C. for 5 mins. and then warmed at 38°C. for 15 mins., the blood showed, besides the haemolysis described by EHRLICH, a pronounced leucocytolysis. The number of leucocytes varied from 6,100 to 10,500 and sometimes the disintegration had proceeded to such an extent that it was impossible to differentiate the cells one from another. The leucocytes in the general circulation were unchanged, but within 20 minutes after the tourniquet was removed there was found to be a distinct leucopenia and a pronounced phagocytosis of haemolysed red cells. *In vitro* experiments with oxalated or citrated blood produced a similar leucocytolysis. The arm immersion experiments were usually quickly followed by a typical paroxysm, *i.e.*, albuminuria, haemoglobinuria and a rigor. Stress is laid on the fact that nothing happened until the tourniquet was removed and the cooled blood allowed to flow into the general circulation.

The author's experiments supported the teaching of LICHTHEIM in so far as a definite haemoglobinaemia always appeared some time before the paroxysm; but they also showed that, in addition to the haemolysis, there was a leucocytolysis and that this also probably played an important part in the production of the general symptoms. Various authors, *e.g.*, WIDAL, SALÉN, etc., have shown that in paroxysmal haemoglobinuria there may be a marked paroxysm associated with leucopenia, but without haemoglobinaemia.

W. Y.

MARSCHALL (Fred). Hämoglobinurie und Nierenveränderungen bei Bartonellenanämie entmilzter Ratten und bei Affenmalaria in ihrer Beziehung zum menschlichen Schwarzwasserfieber. [**Haemoglobinuria and Renal Changes in the Bartonella Anaemia of Splenectomized Rats and in Monkey Malaria in Relationship to Human Blackwater Fever.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Apr. Vol. 40. No. 4. pp. 151–160. With 4 figs. [16 refs.]

Nine of 14 splenectomized rats suffering from an acute Bartonella infection exhibited haemoglobinuria. The renal changes found in these rats coincide with those found in monkeys infected with *P. knowlesi*. In both cases the kidneys exhibited more or less severe epithelial degeneration depending upon the degree of haemoglobinuria. A full description of these lesions is given and the appearances are illustrated in 4 microphotographs. They seem to resemble very closely those found in blackwater fever in man.

The general conclusion reached is that this work furnishes additional evidence that the site of haemolysis in blackwater fever is not the

kidneys but the circulating blood. The haemoglobin in the plasma is excreted through the epithelium of the convoluted tubules. [This view was put forward by the reviewer nearly 30 years ago as the result of his experimental investigations on the excretion of haemoglobin by rabbits injected intravenously with solutions of their own haemoglobin.] W. Y.

PONDER (Eric) & ABELS (Julius C.). **Effect of Quinine Hydrochloride on Resistance of Rabbit Red Cells.**—*Proc. Soc. Experim. Biol. & Med.* 1936. Mar. Vol. 34. No. 2. pp. 162-165.

The purpose of this paper is to show that red cells of rabbits receiving quinine HCl in proper amount are less resistant to lysins such as saponin and sodium taurocholate used *in vitro*. The experiments fall into two groups:—(a) *in vitro* experiments, which show that quinine HCl is a simple haemolysin, and (b) *in vivo* experiments, which show that the resistance of the animal's red cells is lessened by the administration of the quinine salt.

In vitro experiments.—The addition of quinine HCl to systems containing saponin or sodium taurocholate produces a marked acceleration of haemolysis, and this can be measured by the usual methods (Ponder, 1934). If the red cells are left in contact with 1 : 100 quinine HCl for 10 minutes (after which time there is no haemolysis), and then washed and re-suspended, the resulting suspension has a smaller resistance to saponin or taurocholate than has an untreated suspension. The authors' explanation of the phenomenon is that the quinine salt combines with some component of the cell membrane, transforming it sufficiently to bring about haemolysis if the concentration of the quinine is great, and transforming it partially, but sufficiently to decrease its resistance to a subsequently added lysin if the concentration of quinine is less.

In vivo experiments.—In these quinine HCl was given to rabbits in varying dosage and over various periods, and the resistance of the animals' red cells to saponin and to taurocholate was measured at intervals. The experiments are described and the results shown in tables. It was found that successive administrations of quinine HCl bring about a decreased resistance of the red cells to saponin and to taurocholate used *in vitro*. The fall of the red cells and the increase of reticulocytes which occur in the blood of animals dosed with suitable amounts of quinine HCl is probably due to an intravascular lysis, brought about by intravascular lysins present in the blood stream (*e.g.*, bile salts and the unidentified lysins of urine) the action of which is accelerated by the quinine. It is unlikely that the quinine salt itself produces intravascular lysis because a sufficient concentration is never reached in the blood stream. W. Y.

KRISHNAN (K. V.), GHOSH (B. M.) & BOSE (P. N.). **Cholesterol Changes in Monkey Malaria and Haemoglobinuria.**—*Records of the Malaria Survey of India.* 1936. Mar. Vol. 6. No. 1. pp. 1-12. With 1 chart. [25 refs.]

The cholesterol content of the blood of man suffering from malaria and blackwater fever has frequently been studied. As a rule a hypo-cholesterinaemia has been recorded, but occasionally no change from

normal has been found. The inconclusive results obtained in blackwater fever may be partly accounted for by the fact that the examinations were made after the onset of the disease and not prior to it. As the onset of blackwater fever cannot be predicted it is not possible to determine the cholesterol value immediately prior to the condition. In experimental animals this difficulty is not met with because *P. knowlesi* causes in *Silenus rhesus* an acute and intense infection terminating in haemoglobinuria and death within a short period, especially if the animals are splenectomized. This paper records observations made on the cholesterol changes taking place in infected *Silenus rhesus* from the commencement of infection to its termination.

Some of the monkeys were splenectomized in order to intensify the infection and bring on haemoglobinuria. Samples of blood were taken at all stages of the infection and the amount of cholesterol in the whole blood was estimated by Sackett's (1925) modification of Bloor's method. In all 16 monkeys were used, and during the period of the experiment the animals were kept on a standard diet.

The authors summarize their results as follows :—

" The normal blood cholesterol values in *Silenus rhesus* monkeys varied from 143 to 214 mg. per cent. and the average was 177 mg. per cent.

" After infection with *Plasmodium knowlesi* and during the incubation period, no appreciable change was noticed. The value varied from 120 to 213 mg. per cent. and the average was 171.5 mg. per cent.

" During the primary parasitological period of infection, great fluctuations occurred in the cholesterol level. The value varied from 107 to 250 mg. per cent. and the average was 150 mg. per cent. The impression gained was that towards the end of the parasitological period, when the infection was intense, there was a distinct tendency for the cholesterol to diminish in the majority of instances. The values at this stage varied from 107 to 150 mg. per cent. and the average was 125 mg. per cent.

" After quinine treatment and prior to recovery, the cholesterol value generally rose up to normal or slightly higher than normal; while the average value prior to quinine was 125 mg. per cent. it was 194 mg. per cent. after quinine. This represents an average rise of 55 per cent.

" In latency cholesterol values were low but they rose prior to the occurrence of relapse. The average value early in latency was 125 mg. per cent., but prior to onset of relapse it rose to 170 mg. per cent. Increase of cholesterol invariably preceded the onset of relapse.

" During relapse, when the intensity of infection was increasing, the cholesterol value fell markedly unless treatment was given. The value during relapse varied between 97 and 176 mg. and the average was 135 mg. per cent. After treatment the average rose to 169 mg. per cent. This represents a rise of 25 per cent.

" During relapse the cholesterol value was lower than during the primary infection. In the later relapses the values were lower than in the earlier relapses. In chronic long standing malaria a condition of hypocholesterinaemia was seen.

" Twenty-four hours prior to the onset of haemoglobinuria a condition of hypocholesterinaemia was noticed in 4 out of 6 attacks, the cholesterol values being 80, 90, 90, 110 mg. per cent. In the other two attacks the values were normal (150 and 175 mg.). This shows that haemoglobinuria may occur both when the cholesterol value is normal or subnormal.

" In 2 out of 3 monkeys that did not develop haemoglobinuria despite an intense infection, a condition of hypocholesterinaemia occurred (the values were 100 and 125 mg. per cent.). Hypercholesterinaemia during intense infection was not always followed by haemoglobinuria.

" A rise in cholesterol to or above normal values, or a persistence of normal values, after occurrence of haemoglobinuria, invariably resulted in

the disappearance of the condition. The values obtained when haemoglobinuria disappeared were 100, 150, 170, 180 and 200. Cholesterol is capable of exerting an inhibiting influence on haemolysis and haemoglobinuria resulting from intense malarial infection in monkeys. W. Y.

OTTO (I. H.). Zur Behandlung des Schwarzwasserfiebers mit Campolon. Nach H. E. Naumann. [**The Treatment of Blackwater Fever by Campolon.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Oct. Vol. 39. No. 10. pp. 422-425. [10 refs.]

Details are given of two cases of blackwater treated with large doses of campolon; both patients made a speedy recovery. The author lays stress on the fact that he gave his patients campolon alone and not together with glucose and insulin, as recommended by Naumann [this *Bulletin*, 1935, Vol. 32, p. 200]. Blood regeneration was rapid; in one of the patients the red cell count rose from 1,980,000 to 4,700,000, and the haemoglobin value from 45 per cent. to 79 per cent. within 18 days.

W. Y.

NAUMANN (H. E.). Schwarzwasserfieber-Behandlung. [**The Treatment of Blackwater Fever.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Feb. Vol. 40. No. 2. pp. 73-76.

Details are given of 10 cases of blackwater fever treated with atebirin and campolon injections; since all recovered the author believes that this is the treatment of choice.

In reaching a decision upon the proper treatment of this disease, the author states that he kept four points in mind, viz.:—(1) Malaria; (2) damage to the red cells; (3) damage to the liver; and (4) blockade of the renal tubules. The last of these is without doubt a secondary phenomenon and therefore for the present purpose can be neglected. The first factor is treated with atebirin alone, thereby eliminating the unpleasant consequences of quinine and plasmoquine, and the second by large doses of campolon. Great importance is attached to bolstering up the liver function, and the author is now inclined to omit the insulin and glucose previously used by him [this *Bulletin*, 1935, Vol. 32, p. 200] and to rely solely upon campolon, which, besides being a powerful stimulant of the haematopoietic system, exerts a specific action upon the liver function.

W. Y.

HAUER (August). Beitrag zur Behandlung des Schwarzwasserfiebers. [**The Treatment of Blackwater Fever.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Feb. Vol. 40. No. 2. pp. 76-81.

A detailed account is given of a case of blackwater fever treated successfully with intravenous injections of calorose, strophanthin and insulin, and with intramuscular injections of campolon. Although the general result of this treatment is said to have been excellent, stress is laid on the fact that vomiting continued for 36 hours, necessitating the hourly administration of chloroform water. The author discusses the relative value of intramuscular and intravenous injections of liver extract. He considers that the intramuscular injection leads to the formation of a *dépôt* which is utilized with different speeds by different individuals. When the material is given intravenously its action is much quicker. In severe forms of anaemia due to chronic sepsis the author has found that the intravenous injection of 20 cc. of

"Hepatrat ad infusionem" is well tolerated. He emphasizes the fact that the forms of liver extract usually employed for intramuscular injection are not suitable for intravenous administration because they contain certain substances which act on the circulation and may produce the most dangerous shock. The ordinary preparations of liver extract contain small quantities of histamin, but only those which are entirely free from this substance are suitable for intravenous use. He arranges the various liver extracts according to their content of substances acting on the circulation as follows:—hepatopson 15, campolon 25, pernämyl 45, hepatrat 5, and hepatrat.ad infusionem 0.

Details are also given of a patient with malaria, who, whilst improving under a course of atebirin and plasmoquine, was given three applications of short ultra-violet rays because of his enormously enlarged spleen. The radiation appeared to be associated with a definite deterioration of the patient's condition. The spleen decreased considerably in size, but the patient complained of pain in the splenic area, and there was a very considerable fall in the red cell count and haemoglobin value.

W. Y.

CORMAN (A.). L'atébrine et les extraits hépatiques dans le traitement de la fièvre bilieuse hémoglobínurique (dix observations personnelles). [**Atebrin and Liver Extract in the Treatment of Blackwater.**]*—Bull. Méd. du Katanga.* 1935. Vol. 12. No. 3. pp. 93, 95-101, 103-108.

Details are given of ten cases of blackwater fever treated with atebirin and liver extract (campolon). It is noted that 8 of these cases had taken prophylactic quinine regularly prior to the onset of blackwater. Only one of the patients treated in this way died, as compared with 7 deaths among the 13 cases treated by other methods previously. All evidence of haemolysis had disappeared within 4 days and the rapidity with which the blood regenerated was striking.

W. Y.

DANG-HANH-KIÊN. Contribution au traitement de la fièvre bilieuse hémoglobínurique par les injections d'urotropine. [**The Treatment of Blackwater Fever by Urotropine.**]*—Bull. Acad. Méd.* 1935. Oct. 15. 99th Year. 3rd Ser. Vol. 114. No. 32. pp. 282-288.

Details are given of 8 cases of blackwater fever treated by urotropine; all recovered. The author states that, in his opinion, urotropine is not without action in this disease, but how it acts he does not know.

[The reviewer is quite prepared to admit the truth of the last portion of this sentence, but he is not so certain about the first portion.]

W. Y.

MOSTERT (H. v. R.). **Observation on Quinine Prophylaxis and Blackwater Fever in Central Africa.***—South African Med. Jl.* 1935. Dec. 14. Vol. 9. No. 23. pp. 827-832. With 1 chart. [21 refs.]

The value of quinine as a prophylactic against malaria is a matter of paramount importance, but unfortunately one that has been the cause of much controversy in recent years. WATSON in Malaya and RUSSELL in the Philippines hold that the drug as a prophylactic has been a failure, whilst in the opposite camp are many experienced workers.

The experimental work of YORKE and MACFIE [this *Bulletin*, 1925 Vol. 22, p. 50] has shown that in artificially induced malaria quinine is not a true prophylactic. The author doubts, however, whether conclusions drawn from such experiments can be accepted as conclusive proof that the drug is useless as a prophylactic in the malarious areas of Central Africa.

Apparently different strains of *P. falciparum* vary in their sensitiveness to quinine; and it may not be necessary for effective prophylaxis that the sporozoites must be destroyed, the regular taking of quinine may be sufficient to eradicate any trophozoites resulting from periodic infections. The crucial test is whether those physicians, working in the highly malarious regions of Central Africa, have found the regular taking of small doses of quinine a protection or not against the disease.

The author's experience at the Nchanga Copper Mine in Northern Rhodesia is that prophylactic quinine has been an economic success and has enabled the bulk of the staff to give the maximum of useful labour to the Company. Of the 230 cases of malaria which have occurred among the European staff and dependants during the years 1929-1932, only 8 per cent. were regular quinine takers and 92 per cent. were either irregular takers or non-takers. Whether small regular doses of quinine render the blood completely free of parasites or merely repress the disease until such time as the health is below par is an important question. [It is, but the author does not seem able to throw any light on it.]

Mostert next passes to consider how far it is possible to dispense with quinine and rely purely on hygienic measures in a controlled area. His own experience at Nchanga taught him that in addition to sanitary measures the prophylactic use of quinine was indispensable.

Writing on the dangers other than malaria associated with the non-taking or irregular taking of quinine, Mostert says that in the Rhodesian copper fields the recurrent attacks of malaria which inevitably resulted in those who neglected to take their quinine regularly were often responsible for two serious complications, *viz.*, abortion in pregnant women, and blackwater fever. A summary is given of 32 cases of blackwater fever treated by the author. All give more or less the same history of not taking quinine or of taking it irregularly in the intervals between their bouts of fever.

The paper closes with some remarks on the treatment of blackwater fever.

W. Y.

AMOEBIASIS.

CRAIG (Charles F.). **Observations upon the Methods of Transmission of Amebiasis.**—*Amer. Jl. Public Health.* 1935. Nov. Vol. 25. No. 11. pp. 1231–1236.

This article though bringing forward no new evidence is worth study because it puts into proper perspective the ways in which amoebic infection may be contracted. The Chicago outbreak of 1934, owing to its seriousness, has somewhat tended to swing the balance too much to the side of the "water-borne" disease. This outbreak did not bring to light any fresh epidemiological evidence—it merely showed that cross-connexion between polluted water or sewage and the domestic water supply was fraught with danger, a fact quite well-known already. In paying attention to this we must not forget or minimize the dangers of infected food-handlers, flies, vegetables contaminated by sewage, etc. [see also this *Bulletin*, 1935, Vol. 32, p. 189.]

H. H. S.

O'CONNOR (Francis W.). **Dissemination of Amebiasis.**—*Arch. Intern. Med.* 1935. June. Vol. 55. No. 6. pp. 997–1000.

A paper dealing at first with the life history of *E. histolytica* and its usual mode of spread, leading up to a consideration of the Chicago outbreak in 1933 and showing how the earlier ideas that the infection was spread by food-handlers proved later to be erroneous. A good general epidemiological address. [See *Bull. of Hyg.*, Vol. 9, pp. 178, 278, 315.]

H. H. S.

NAUSS (Ralph W.) & SALINGER (May H.). **Amebic and Other Intestinal Protozoal Infestations in Representative Groups of New York City.**—*Amer. Jl. Public Health.* 1935. July. Vol. 25. No. 7. pp. 819–828. [22 refs.]

The examination by direct microscopical methods on a single occasion of 270 individuals in New York City gave an incidence of intestinal protozoa of 9.1 per cent. with 1.1 per cent. for *E. histolytica*. A group of 222 food handlers gave figures of 31.9 and 5.4 for a single examination. As the result of the re-examination on one or two occasions of a number of individuals out of the 222 food handlers it is concluded that the actual *E. histolytica* infections in this group might possibly have been between 9 and 10 per cent. instead of 5.4 per cent., the figure given by the single examination. Cultures were obtained of all the culturable forms on Cleveland's medium and it was noted that *Dientamoeba fragilis* and *Endolimax nana* appeared on a number of occasions.

The significance of the relatively large number of individuals infected with *E. histolytica* in the absence of symptoms is discussed. It is suggested that symptoms may appear only when certain bacteria are present. In support of this it is noted that an old culture of *E. histolytica* failed to infect kittens till it was inoculated together with a broth culture of a haemolytic variety of *Bact. coli*.

C. M. Wenyon.

KABLER (Paul). Incidence of Infection with Intestinal Protozoa in Minnesota.—*Amer. Jl. Med. Sci.* 1935. July. Vol. 190. No. 1. pp. 103–106. [14 refs.]

The examination was conducted on 146 "healthy working food handlers of a large railway system." Each individual was examined after the administration of a saline cathartic on one occasion only. One or more of all the common intestinal protozoa were found in 24·67 per cent. ; *Entamoeba histolytica* giving the low figure of 1·37 per cent.

C. M. W.

CONNELL (Frank H.). Amebiasis in a Rural Community.—*New England Jl. of Med.* 1935. Oct. 17. Vol. 213. No. 16. pp. 748–750.

The author undertook the examination of faeces of 700 students, freshmen at Dartmouth University, New Hampshire, U.S.A. The subjects came from various parts of the States and were apparently in good health. The examination has not yet been completed but so far he has found six to be infected with *E. histolytica* and 14 were passing *Giardia lamblia*. Among 63 townspeople examined at the laboratory during the past 3 years there were none with *E. histolytica* and only 2 with *Giardia*. The proportion is almost certainly greater than the former figures would indicate for, by faecal examination only and particularly when the number of specimens is limited (in these persons to two each) others would be missed. All those found to be cyst-passers in the college group were given carbarsone 0·25 gm. twice a day with grain 1/2 of emetin for 10 days. This treatment "produced stools that were free from cysts and amoebae, and have continued to remain free."

H. H. S.

AUSTIN (T. A.) & MAYNE (L. C.). A Review of the Incidence of Amoebiasis in Zomba, with Special Reference to European Cases.—*Nyasaland Protectorate Ann. Med. & San. Rep. for Year ending 31st December, 1934.* Appendix III. pp. 73–82.

Dysentery has been recorded in Nyasaland in Annual Reports for nearly a quarter of a century, but proper scientific investigation regarding the prevalence has only recently been undertaken. SHELLEY in 1932–33 examined the faeces of 1,123 residents of Zomba, 279 Europeans and 844 Africans, and found 21·8 per cent. of the former and 3·5 per cent. of the latter to be infected with *E. histolytica*. In 1932 twelve cases were reported, in 1933 twenty-two (6 in December) and in 1934 thirty-three (14 in December), i.e., more in the early part of the rainy season, when flies are abundant. In Zomba, Nyasaland, the rainy season extends from November to April and is heaviest in January and February. Native servants live in compounds surrounding the European residences. The water supply is now a pipe-borne gravity supply. Food is abundant and varied, but vegetables are not regarded as safe from contamination unless their place of growth is known (e.g., small vegetable gardens of European residents). In March and April 1934, 427 faecal specimens from house servants of Europeans were examined (fifteen householders were so short-sighted as to refuse any examination) and 7 contained *E. histolytica*. During the last 9 months of 1934, 405 prisoners were examined, one was passing *E. histolytica* and

40 were cyst passers; and in 9 of 97 specimens from inmates of the Central Lunatic Asylum the cysts were found.

Disposal of night soil in Zomba is not satisfactory and flies are many. Rectification of the sewage disposal, cutting down banana groves where promiscuous defaecation occurs and of mango trees, a source of decaying pabulum for flies, will do much to eliminate the fly nuisance.

There are three clinical types of amoebiasis in Zomba: acute dysentery, diarrhoea and abdominal discomfort, and amoebic hepatitis. With few exceptions the disease is of a mild type. Infection is far from rare in children; 11 cases were recorded under the age of ten years in 1934-1935 in 54 weeks, and in them the onset is more severe than in adults, with higher fever and sometimes with vomiting.

The best treatment has been found to be a combination of emetine hydrochloride injections intramuscularly 1 grain daily for 8-10 days and a daily enema of 200 cc. of a 1 per cent. solution of quinoxyl. Emetine periodide was tried but was badly tolerated and discontinued. To children emetine was not given but $\frac{1}{4}$ - $\frac{1}{2}$ tablet [strength not stated] of quinoxyl thrice daily by mouth for 10 days and 0.5-1.0 per cent. quinoxyl enemata.

H. H. S.

AUSTIN (T. A.) & MAYNE (L. C.). **A Review of the Incidence of Amoebiasis in Zomba, with Special Reference to European Cases.**—*East African Med. Jl.* 1935. June. Vol. 12. No. 3. pp. 68-88.

Dysentery has probably been endemic in Nyasaland for a long time. More than a quarter of a century ago the Medical Officer of Zomba remarked that dysentery was one of the principal diseases among Europeans. Not till ten years ago, however, was any distinction made in the Annual Report between the different types of dysentery. Coming to more recent times, in 1933 Dr. H. M. SHELLEY examined 279 specimens of faeces from Europeans and 844 from Africans and found the amoeba in 21.8 per cent. of the former and 3.5 per cent. of the latter [see also this *Bulletin*, 1934, Vol. 31, Supp. p. 58*]. European cases of amoebic dysentery in Zomba have increased in the last three years, the figures being 12, 22, and 33 respectively. The infection is more prevalent in the rainy season, most cases being reported in December. Though not definitely recorded as occurring among children, until 1933, the fact that certain cases of so-called enteritis in children were in houses where one or other parent had suffered from dysentery is at least suggestive; during 54 weeks from January 1st, 1934, eleven cases were reported in children under 10 years. The prevalence of flies and the general state of sanitation (or absence of it especially among native women and children) were certainly favourable to the multiplication of vectors and spread of infection. Now that improved methods of sanitation have been introduced there is every probability of a marked reduction in the number of cases in the future. [See preceding abstract for other details.]

H. H. S.

ALEXANDER (Frank D.) & MELENEY (Henry E.). **A Study of Diets in Two Rural Communities in Tennessee in which Amebiasis was prevalent.**—*Amer. Jl. Hyg.* 1935. Nov. Vol. 22. No. 3. pp. 704-730. [22 refs.]

A survey of the diets in one community (Hatchie) where acute amoebic dysentery was common and in another (New Hope) where it

was very rare, although 40 per cent. harboured *E. histolytica*, was made. Hatchie is situated in the plains and contains whites and negroes, New Hope in the hills and contains whites only. New Hope households consumed diets superior to those of Hatchie in the following respects:—variety of major foods, consumption of sweet milk, fruits and green vegetables, caloric intake, vitamins A, B₁, B₂, C and D intake. In both communities protein intake was at a standard level, but the fat intake was below standard (24 per cent.—standard, 36). There were wide variations in the number of foods used by individual households (from 10 to more than 30). In general the whites of Hatchie fared better than the negroes. None of the negro households used foods containing adequate amounts of vitamin D. A comparison of the winter and summer foods showed that the principal articles of food were essentially the same. There was no definite difference in the physique (height, weight, age-ratio), of the two communities and no correlation was found between caloric consumption and under- or over-weight. No correlation was found between dietary inadequacies and harbouring of *E. histolytica* in individual households. It is interesting, however, that in New Hope, where milk, greens and fruit were more abundantly eaten, the amoebae obtained were less pathogenic for kittens than strains from Hatchie. No clinical studies were made to determine whether any deficiency diseases existed. The large amount of corn-meal used by both communities was the most striking common feature of the diets. It would be beneficial if the poor rural people of the southern states would substitute other foods, particularly animal protein and vitamin-containing foods, for a large part of the corn meal.

H. N. H. Green.

WENRICH (D. H.), STABLER (R. M.) & ARNETT (John H.). *Endamoeba histolytica* and Other Intestinal Protozoa in 1,060 College Freshmen. —*Amer. J. Trop. Med.* 1935. May. Vol. 15. No. 3. pp. 331–345. [19 refs.]

At a professional institution in Philadelphia a single stool specimen from each of 1,060 freshmen was subjected to examination for intestinal protozoa. Though the specimen had been obtained without the use of a laxative one or other of the usual intestinal protozoa were found in 34.5 per cent., 4.1 per cent. showing *Entamoeba histolytica*. The percentage of *E. histolytica* for Philadelphia and its suburbs was 5.2, a figure higher than that for other parts of that State. The cases of *E. histolytica* infection appeared to be as healthy as those giving a negative result, while no cases of amoebic dysentery were detected during the three years of this investigation. It is of interest that the supposedly rare *Dientamoeba fragilis* gave an incidence of 4.3 per cent.

C. M. W.

PURCARO (Giuseppe) & ELISEI (Carlo). Reperto parassitario nelle feci di individui provenienti dalla Sardegna e dalla Sicilia con speciale riguardo all' amebiasi. [The Presence of Amoebae in Faeces of Sardinians and Sicilians in Modena.]—*Arch. Ital. Sci. Med. Colon.* 1935. Aug. 1. Vol. 16. No. 8. pp. 574–581. English summary (3 lines.)

The numbers examined were small, 50 Sardinians and 50 Sicilians, young persons who had never lived for any length of time in Modena.

Among the former 21 were excreting *E. histolytica*, 8 had symptoms of intestinal disturbance, 13 had none. Among the latter *Entamoeba* was found in 9, three with symptoms, 6 without; i.e., in 42 per cent. of the Sardinians and 18 per cent. of the Sicilians the parasite was found. Other parasitic findings—helminthic ova, *Giardia*, *Blastocystis*, *Trichomonas*—were noted in a few individuals only. H. H. S.

MATEWOSSIAN (Sch. M.). Amoebiasis und ihre Endemie in Armenien. [The Endemicity of Amoebiasis in Armenia.]—*Arb. d. Tropen-instituts d. Volksgesundh. Kommissariat d. SSR. Armenien*. 1935. Vol. 2. [In Russian p. 346. German summary pp. 373–374.]

The extent of amoebiasis in Armenia is not known with any certainty, first because no accurate statistics are available, second because only the acute dysenteric form is known and, third, specimens are not always sent to a laboratory by which alone can correct diagnosis be made.

In the last 8 years in the protozoological section of the Tropical Institute, Eriwan, over 5,000 specimens of faeces have been examined and a considerable percentage were positive for *E. histolytica*. During the last 3½ years 20·6 per cent. of specimens from 714 adults and 6·4 per cent. of 408 children revealed amoebae; all presented symptoms of acute or chronic intestinal disease. Examination of large groups of the population revealed 20 per cent. to be harbouring the amoeba.

H. H. S.

ZATURJAN (A. T.). Protozoen-Infektionen des Darmtraktes im Kindesalter in Armenien. [Intestinal Protozoa among Children in Armenia.]—*Arb. d. Tropeninstituts d. Volksgesundh. Kommissariat d. SSR. Armenien*. 1935. Vol. 2. [In Russian p. 347. German summary p. 375.]

Amoebiasis in children is much less common than in adults and when present runs a more benign course, rarely showing any serious complications. Carriers were found in 6–7 per cent., "a much smaller proportion than among adults" [not stated in figures]. In 58·7 per cent. of children with *E. histolytica* there was also present *G. intestinalis*, and the latter was seen in 26·5 to 45·9 per cent. of children. The presence of the latter was accompanied by a chronic, relapsing type of enterocolitis, but not much constitutional disturbance. Balantidiosis was found in children who evidenced no symptom of disease, and when symptoms were present the course was benign. Up to the present time one case only of human coccidiosis (*isospora*) has been recorded in S.S.R.A.

H. H. S.

Simić (Tsh.). L'infection à protozoaires intestinaux des écoliers de Skoplje. [Infection of School Children at Skoplje by Intestinal Protozoa.]—*Ann. Parasit. Humaine et Comparée*. 1935. May 1. Vol. 13. No. 3. pp. 231–233.

The examination of 110 school children of 8 to 12 years of age for intestinal protozoa at Skoplje has given the following results:—*Entamoeba dispar* 44, *E. hartmanni* 14, *E. coli* 92, *Endolimax nana* 94, *Pseudolimax bütschlii* (= *Iodamoeba bütschlii*) 52, *Lambliia intestinalis* 27, *Trichomonas intestinalis* 44, *Chilomastix mesnili* 16, *Tricercomonas*

intestinalis 20. Some figures are given of the tolerance for heat and cold of a number of amoebae and flagellates, while the relative values of direct examination and culture methods for the detection of each form are given. It has to be remembered that the *E. histolytica* of most authorities is divided by the author into *E. dysenteriae*, *E. dispar* and *E. hartmanni*. Presumably *E. dysenteriae* was not found in the school children because none of them showed any symptoms. It is difficult to suppose that all the tests which the advocates of *E. dispar* consider necessary to distinguish it from the pathogenic form were applied in all of the 44 cases of infection. In another paper the author states that *E. dispar* can only be differentiated with certainty from *E. dysenteriae* after passages in laboratory animals. C. M. W.

MORCOS (Z.). *Entamoeba histolytica* in Dogs.—*Jl. Egyptian Med. Assoc.* 1936. Feb. Vol. 19. No. 2. pp. 63-64.

The author quotes from the literature records of natural and experimental infection of dogs with *E. histolytica*, and goes on to state that at the Cairo Veterinary School all dogs suffering from diarrhoea or in a wasting condition are examined for helminthic or protozoal infection. Five cases have been reported in recent years, 3 from Giza, one each from Kobba and Heliopolis. All were passing watery, blood-stained stools and vegetative forms of *E. histolytica* were seen in each; one of the first three was given emetine 0.03 gm. subcutaneously on 3 successive days [nothing is said of the other two from Giza] and the others had two Yatren pills daily for 10 days. The three whose treatment is mentioned recovered. H. H. S.

REICHENOW (Eduardo) La cuestion de los portadores sanos de la amiba disenterica, *Entamoeba histolytica* y el valor patogeno en general de los protozoos intestinales.—*Medicina Paises Calidos* Madrid 1935. Sept Vol. 8. No. 9. pp. 409-420

DOPTER (Ch.) & DESCHIENS (R.). Action comparée du sérum humain et du sérum de cheval sur les cultures de l'amibe dysentérique. [Comparison of Human Serum with that of the Horse in the Cultural Growth of the Dysentery Amoeba.]—*C. R. Soc. Biol.* 1935. Vol. 119. No. 27. pp. 1370-1373.

In the investigation described in this paper it was found that two strains of dysentery amoeba gave 5 times more growth when human serum was used instead of horse serum in the medium employed.

C. M. W.

YOSEZATO (Morio) Investigations on Amoebic Dysentery. VIII. On a New Method for the Cultivation of *Entamoeba histolytica*.—*Jl. Oriental Med.* 1935. Mar. Vol. 22. No. 3. [In Japanese pp. 467-474. With 1 chart. English summary p. 41.]

The author maintains that the substitution of 3 per cent. sodium citrate solution for Ringer's or Locke's solutions in the composition of media intended for the cultivation of *E. histolytica* is an advantageous procedure. C. M. W.

DESCHIENS (R.). Modification de la virulence pour le chat d'une souche d'amibes dysentériques conservée en culture. [**Effect of Cultivation of *E. histolytica* on its Virulence for Cats.**—*Bull. Soc. Path. Exot.* 1935. June 12. Vol. 28. No. 6. pp. 481-490. [12 refs.]

The author discusses the experiments of various observers who have attempted to prove that the virulence of *Entamoeba histolytica* does or does not diminish by culture in artificial media. He records observations which he has made with a strain of amoeba isolated from the stool of a case of dysentery which at the time of isolation proved virulent for kittens, for two of three animals inoculated per rectum with the stool developed amoebic dysentery. The amoeba was maintained in culture by subculturing every 5 days, and with cultures between the 90th and 220th day 10 kittens were inoculated per rectum and 13 into the ileum, after laparotomy, without one of the animals developing dysentery. It is concluded that a virulent strain of *Entamoeba histolytica* may lose this virulence during prolonged cultivation. C. M. W.

GAUDUCHEAU (A.). À propos de la phagocytose amibienne. [**On Phagocytosis by Amoeba.**—*Bull. Soc. Path. Exot.* 1935. June 12. Vol. 28. No. 6. pp. 420-422.

The paper refers to experiments carried out with an amoeba which the author has cultivated on agar from Saigon water. When inoculated on to cultures of certain bacteria it destroys the bacteria very much as bacteriophage does. Certain bacteria are acted upon only if the amoeba is associated with *Bact. coli*. This amoeba, recently isolated, the author identifies with one he cultivated from human faeces in 1907 and which he named *Entamoeba phagocytoides*, believing it to be a form parasitic in the human intestine. He now refers to it as *Endolimax phagocytoides*, a name used by some observers for the parasitic *Endolimax nana*, which certainly does not grow on ordinary agar media.

C. M. W.

GARCIA (Eusebio Y.). **Effects of Chlorinated Lime in Lethal Concentrations on *Entamoeba histolytica* Cysts.**—*Philippine Jl. Sci.* 1935. Mar. Vol. 56. No. 3. pp. 295-311. With 18 figs. on 1 plate. [13 refs.]

In estimating the length of survival of cysts of *Entamoeba histolytica* in water or solutions of disinfectants, reliance has been placed on the assumption that dead cysts stain with eosin or that living cysts will give rise to cultures of amoebae when brought into suitable culture media. Both these tests of variability the author regards as fallacious. He considers that direct observations on the cysts for evidence of internal degenerative changes in nuclei and cytoplasm, called by him necrobiosis, are more reliable. He finds that 3.3 parts per million of chlorine (resulting from the addition of calcium hypochlorite) produce destructive changes in the cysts which are enhanced rather than diminished by the presence of nitrogenous organic matter. This strength of chlorine, however, renders water unsuitable for drinking.

C. M. W.

SUMI (I.) & INOUE (K.). **Investigations on Amoebic Dysentery. VII. Simple Method for the Determination of Degenerated Trophozoite and Cysts of *E. histolytica* in the Feces.**—*Jl. Oriental Med.* 1935. June. Vol. 22. No. 6. [In Japanese pp. 1001-1009. [17 refs.] English summary pp. 88-89.]

The authors find that even after death *Entamoeba histolytica* can be distinguished from other cells by the character of the nucleus stained by mixing the material with 0.3-0.5 per cent. aqueous solution of methyl green. The nuclei of the amoebae take much longer to stain than do those of cells. Cysts in faeces can be concentrated by emulsifying 1-2 gm. of the stool in 30 cc. of sugar solution having a specific gravity of 1.070. Some of the supernatant fluid (5 cc.) is filtered through gauze and centrifuged, after which 1 cc. of the supernatant fluid is diluted with water and centrifuged. The deposit will contain the cysts.

C. M. W.

PENSO (Giuseppe). Sull' individualità morfologica dell' *Entamoeba dispar* (Brumpt). [Diagnosis of *E. dispar* on Morphological Grounds.]—*Arch. Ital. Sci. Med. Colon.* 1935. Aug. 1. Vol. 16. No. 8. pp. 563-573. With 5 figs. [12 refs.] English summary (2 lines).

The author has undertaken the difficult task of comparing morphologically the amoebae which occur in cultures obtained from a case of *Entamoeba dispar* (the human amoeba, which though resembling *E. histolytica* morphologically, is supposed to be never pathogenic to man and cats) infection and those in cultures of *E. histolytica*. He concludes that these can be distinguished for various reasons, one of which is the eccentric position of the karyosome in a certain percentage of the amoebae in the *E. dispar* cultures. It seems that in the first place a diagnosis of *E. dispar* can only be made by attempting to infect cats and as these animals are not invariably susceptible to known *E. histolytica* the number of attempts is a matter of some importance. The author does not state how many attempts were made to infect cats with his strain. [Neither the originator of the idea that *E. dispar* was a species distinct from *E. histolytica* nor others who have adopted this view have made any claim that the two amoebae could be distinguished morphologically.]

C. M. W.

SIMFC (Tsh.). Infection expérimentale du chat et du chien par *Entamoeba dispar* et *Entamoeba dysenteriae*. Réinfection et immunité croisée du chien. [Experimental Infection of Cats and Dogs by *E. dispar* and *E. histolytica*. Reinfection and Crossed Immunity in the Dog.]—*Ann. Parasit. Humaine et Comparée.* 1935. July 1. Vol. 13. No. 4. pp. 345-350.

The author points out that the separation of *Entamoeba dispar* from *Entamoeba "minuta"* of the cycle of *E. dysenteriae* can be effected with certainty only after their passage in laboratory animals. By this statement the author means that an infection with *E. dispar*, which consists of small amoebae and 4-nuclear cysts morphologically similar to the carrier condition of *E. histolytica* infections, where small amoebae and 4-nuclear cysts also occur, can only be recognized by animal experiment in which the pathogenicity of the amoebae and cysts belonging to

E. histolytica contrasts with the relative lack of pathogenicity of those belonging to *E. dispar*. This view, if correct, would of course make it quite impossible to distinguish the carrier condition of *E. histolytica* from *E. dispar* by direct microscopical examination. It is further pointed out by the author that the experiments he describes in this paper indicate that the dog always recovers from an experimental infection due to *E. dispar* but only occasionally from one due to *E. dysenteriae*. Furthermore, the dog having recovered from an *E. dispar* infection cannot be reinfected with this amoeba though it can be infected with *E. dysenteriae*. Similarly one infection with *E. dysenteriae* usually but not always produces an immunity against this amoeba. When a dog is infected with *E. dispar* the infection lasts 6-8 days, whereas the infection with *E. dysenteriae* lasts 60-120 days. It has to be noted that only dogs under 6 months of age can be infected with *E. dispar*. The *E. dysenteriae* infection in dogs and cats is definitely pathogenic, producing ulcerations and amoebae with ingested red blood corpuscles. The *E. dispar* infection in these animals is quite benign. The author concludes that the dog is the most suitable animal in which to carry out experimental work with amoebiasis.

[To the reviewer it still seems futile to attempt to separate *E. dispar* from *E. histolytica* on the grounds of differences in pathogenicity. It seems to him that all the differences described can be more reasonably accounted for by the supposition that races of *E. histolytica* of varying virulence occur and that hosts vary in their susceptibility to the one species.]

C. M. W.

HAKANSSON (E. G.). **The Use of Aqueous Smears in the Study and Identification of the Amoebae of Man.**—*Amer. Jl. Trop. Med.* 1935. July. Vol. 15. No. 4. pp. 439-453. With 29 figs. on 2 plates.

The author describes changes which occur in the intestinal amoebae of man when placed in water. The changes are not the same for each species so that they can be employed as an aid to diagnosis.

C. M. W.

CHANG (Hsiao-ch'ien), CH'EN (Kuo-chen) & CHOU (Shou-k'ai). **Further Observations on the Diagnosis of Amebic Dysentery.**—*Chinese Med. Jl.* 1936. Jan. Vol. 50. No. 1. pp. 17-26.

The authors' observations are based on a study of 50 cases of amoebic dysentery seen by them personally and on an analysis of 75 cases treated in the hospital wards. Among 45 cases of active amoebic colitis only 51 per cent. were confirmed by faecal examination, 49 per cent. needed the sigmoidoscope. In many of those in whose stools amoebae were found repeated examinations were required before a positive result was obtained, in two of them as many as 15. At the Peking Union Medical College Hospital admissions for bacillary dysentery were ten times as numerous as those for the amoebic form. The latter was uncommon in children; none were below 9 years of age and only four below 15 years. Frank dysenteric symptoms—passage of blood and mucus with tenesmus and colic—were present in two-thirds only; in about half, the characters of the stools differed essentially from those of the bacillary form, but mixed infection with amoebic and bacillary

was present in about 7 per cent. The sigmoidoscope, they maintain, is the best and quickest means for diagnosis, it is "simple, harmless, and with care need not be unpleasant to the patient." H. H. S.

FABIANI (G.) & DENDALE (R.). Les réactions de gélification du sérum sanguin au cours de l'amibiase. [**Gelification of Serum in Amoebic Infections.**]—*Bull. Soc. Path. Exot.* 1935. July 10. Vol. 28. No. 7. pp. 556-557.

The humoral changes which occur with regularity in many chronic diseases, such as malaria, leishmaniasis, trypanosomiasis, tuberculosis, syphilis, leprosy, are non-existent in amoebic infections as manifested by the failure of sera to give positive gelification reactions with formol or lactic acid. Furthermore, the estimation in two cases of the total albumin of the blood and the albumin-globulin ratio gave figures which were approximately normal. C. M. W.

SPECTOR (Bertha Kaplan). **The Pathological Changes produced in the Intestines of Kittens by *Endamoeba histolytica*, with and without Certain Added Bacteria.**—*Amer. Jl. Hyg.* 1935. Sept. Vol. 22. No. 2. pp. 366-375. [20 refs.]

The incidence of amoebic infection and the severity of the lesions in kittens inoculated with *E. histolytica* are increased if the amoebae are inoculated along with certain freshly isolated bacteria such as haemolytic streptococci and pneumococci. These bacteria cease to have this effect after prolonged culture. C. M. W.

WILLIAMS (Pauline). **Amoebic Abscess of the Liver. Report of Fatal Case in which Etiology was First Demonstrated in Tissue Sections of Diaphragm, following Autopsy. No Previous Manifestations of Amoebiasis.**—*Southern Med. Jl.* 1935. Oct. Vol. 28. No. 10. pp. 902-905. With 2 figs.

The interest of this case lies in the fact that none of the usual methods of diagnosing amoebic abscess was successful. There was known to be a large liver abscess present and this had extended through the diaphragm to the right lung. Examination of the liver pus, of the expectorated matter, of scrapings from the wall of the abscess cavity and of the stools failed to reveal the entamoeba. The patient died and again examination of the lung, the liver and the intestine was negative for the protozoon. The diaphragm was thickened and oedematous with an area of necrosis and ulceration and in sections of this the entamoebae were numerous. No history of exposure to infection nor of any previous dysenteric symptoms was obtainable. H. H. S.

BERETERVIDE (Juan José) & MASOCH (Tomas J.). Hepatitis amebiana congestiva a forma tumoral. [**Localized Congestive Amoebic Hepatitis.**]—*Arch. Argentinos Enferm. Aparato Digest. y Nutric.* Buenos Aires. 1935. Aug.-Sept. Vol. 10. No. 6. pp. 589-596.

The case is reported of a man of 32 years with signs of a swelling of the upper part of the left lobe of the liver and localized pain. The leucocytes in his blood were 14,000 per cmm. with 57 per cent. polymorphonuclear. The faeces showed *E. histolytica* in large numbers, although no history of dysentery was obtained. The condition improved with

rest but, after he had been 24 days in hospital, emetine was given and the swelling, stated to be as large as an orange, disappeared, together with the pain. H. H. S.

YENIKOMSHIAN (H. A.). Amoebic Hepatitis.—*Jl. Egyptian Med. Assoc.* 1935. Dec. Vol. 18. No. 12. pp. 783-791.

MARINO (S.). Ascesso amebico del fegato. Contributo clinico.—*Poli-clinico. Sez. Prat.* 1936. Mar. 9. Vol. 43. No. 10. pp. 434, 437-8, 441-4, 447-8. [15 refs.]

HUARD (P.), RENUCCI (N.) & HUYNH-TAN-DOI. Les abcès du foie non amibiens. [*Liver Abscesses other than Amoebic.*]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1935. Sept. Vol. 13. No. 7. pp. 849-873.

There is undoubtedly a tendency for medical men practising in the tropics and subtropics to regard hepatic abscess as a sequela of amoebic dysentery or as a form of amoebiasis to the exclusion of other causes, and to try the effects of emetine or some drug treatment before resorting to operative measures—a procedure justified in the first case, but disastrous in the second. Hence this article, though breaking no new ground, is worth noting, because cases are detailed in which mistake might easily be made and valuable time lost. Among these mention may be made of streptococcal abscess arising from infection of an old amoebic lesion, liver abscess as one of several occurring in a staphylococcal septicaemia, another due to ascariasis, one to *Pf. whitmori* as a complication of melioidosis, etc. The moral is, of course, that careful examination should be undertaken to determine the amoebic source of the abscess before deciding to postpone operation. H. H. S.

MEYER-MAY (J.) & HUARD (P.). Note sur l'étiologie des abcès du foie. [*On the Causation of Liver Abscess.*]—*Bull. Soc. Path. Exot.* 1936. Jan. 8. Vol. 29. No. 1. pp. 61-72.

This article has been written on an analysis of 150 cases of hepatic abscess seen at the surgical clinic of the Hanoi School of Medicine. Of the total 138 were males, 12 females; 66 were in whites, 84 in natives, the latter including Tonkingese, Hindus and Koreans. Forty-three (28.6 per cent.) were definitely known to have had dysentery, 66 had not, and 41 were doubtful. The pus was examined for organisms and amoebae were found in 7 only, among 70 faecal examinations entamoebae were seen in five. Amoebic origin seemed to be more frequent in those from certain districts, rarer in others, e.g., Tonking. [This statement is based on previous statistics, when the diagnosis was made on purely clinical grounds.] Causes other than amoebic are reported in 27 cases [but "causes" is hardly justified, as from the text it appears that all that is meant is "organisms isolated," their aetiological rôle is not proved and in some at least is highly problematical]. Staphylococci were found in 5, streptococci in 4, "various cocci" in 5, *Bact. coli* in 4, enterococcus and pneumococcus each 3, *Pf. whitmori*, *Bact. dysenteriae* His, and fusiform bacilli each once.

The staphylococcal origin was certain in one case, as the liver abscess occurred as a complication of a severe furunculosis with septicaemia. [While the presence of cocci and intestinal organisms does not

prove these to be the cause of the abscess, neither does the failure to find entamoeba disprove the aetiological rôle of the latter.] *H. H. S.*

PANAYOTATOU (Angélique). Sur un cas d' "amibiase intestinale et bronchique." [*Intestinal and Bronchial Amoebiasis.*—*Rev. Méd. et Hyg. Trop.* 1935. Sept.-Oct. Vol. 27. No. 5. pp. 231-232.

A child of 2 years was seriously ill with amoebic dysentery and a persistent cough which prevented any rest at night. The stools numbered 30-35 in the 24 hours, contained blood and entamoebae and were accompanied with tenesmus. Emetine hydrochloride 0.03 gm. was given together with 0.1 gm. camphostyle solution. Amelioration was rapid; the stools were only half as frequent next day and in a few days were reduced to 3 or 4 in the day and free from blood. The cough also cleared up after the third day. [There is no direct evidence that the cough was due to bronchial amoebae; the reason for so regarding it is that it disappeared rapidly after injections of emetine, and that other cases of bronchitis, without any intestinal amoebiasis, when treated in the same way did not thus respond.] *H. H. S.*

CHAUVIN (Louis). Sequelles d'amibiase avec poussées congestives hépatiques, syndrome de colite spasmodique pneumopathie seconde. [*A Case of Amoebiasis with Sequelae.*—*Tunisie Méd.* 1936. Jan. Vol. 30. No. 1. pp. 1-9.

The chief point worthy of note in this case is the scarcity of objective signs to account for persistent subjective symptoms and complaints. The patient was a Sergeant, a male army sick attendant, a Tunisian, who was admitted to hospital in Fez in 1928 suffering from amoebic dysentery. This was followed later in the year by symptoms of appendicitis and appendicectomy was performed. In the summer of 1929 he had a relapse of his dysentery with much pain in the right iliac fossa; a second laparotomy was performed but nothing discovered to account for the symptoms. In the spring of 1930 he again relapsed with dysentery, and had pain in the hepatic area and in the right shoulder. The blood showed a little anaemia; red cells 3,990,000, white 9,300 per cmm. Improvement of symptoms followed administration of emetine for 5 days, then stovarsol and [for some reason not mentioned, as the infection was amoebic] dysentery bacteriophage. Soon after, shoulder pain and pain on breathing were marked, and there was a subicteric tint of the conjunctivae; he expectorated chocolate-coloured sputum. Physical signs in the thorax were a few fine crepitations beneath the right clavicle; on the left side in front harsh inspiration, and behind slight V.F.+ and fine subscapular crepitations. Emetine was again given, this time intravenously, 4, 6, and 8 cgm., and stovarsol. Convalescence was thereafter rapid.

H. H. S.

OGURO (T.). Ueber einen Fall von im Verlauf der Amöbendysenterie beobachteter Tetanie. [*Tetany in Amoebic Dysentery.*—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1935. Nov. Vol. 34. No. 11 (368). [In Japanese pp. 1844-1849. German summary p. 1850.]

A woman of 36 years suffering from dysentery and whose condition was improving after administration of emetine and yatren developed

signs of tetany. Trousseau's Chvostek's, Erb's (increased electric irritability of motor nerves) signs, and Schlesinger's leg phenomenon were all present. The calcium content of the serum was 8.6 mgm. per cent., later increased to 10.9. In spite of all treatment the patient became weaker and died two weeks after the onset of the tetany. [This is of interest as possibly being an example of dysentery which might be followed by sprue had the patient lived, since the serum calcium was so reduced. Schlesinger's phenomenon is elicited by holding the patient's leg at the knee and flexing strongly at the hip; in a short time an extensor spasm occurs at the knee with marked supination of the foot.]

H. H. S.

WILKINSON (W.). **Chronic Amoebiasis and Chronic Appendicitis.**—*Brit. Med. J.* 1935. Sept. 7. pp. 452-453.

It is not an uncommon experience to meet with patients who complain after, sometimes a long time after, an appendicectomy that they suffer from abdominal discomfort, flatulence, biliousness, general malaise and pain more or less localized to the right iliac fossa, and who present a certain degree of pallor, a furred tongue, a thickened and tender colon and an enlarged liver. Examination of fresh stools from these patients, in the tropics, reveals in a considerable number *E. histolytica*. The importance of the freshness of the stools is well known to all workers in the tropics and is well exemplified in Kenya where 366 cases only had been recorded during ten years among Europeans and natives examined at the laboratory some distance away, but in 5 months at the European hospital alone 125 positive findings were recorded when stools were examined on the spot. Treatment on the usual lines for amoebiasis proved efficacious among those with amoebae in the stools, and the same treatment was adopted for negative cases presenting similar symptoms, and these also benefited. Two typical cases are reported in detail.

Treatment of chronic amoebiasis is disappointing because the amount of the drug needed to act on the parasite which may be deep in the tissues is usually more than the patient can tolerate with safety. Carbarsone is probably the best or its congener amibiarsone. Again, in the tropics there is often a liability to re-infection, since in East Africa [and elsewhere] amoebiasis is far from uncommon among Africans, and cooks and houseboys may be cyst-passers.

H. H. S.

LOMBARDO (Vito). L'appendicite in portatori di ameba. [**Appendicitis in Amoeba Passers.**—*Riv. Sanitaria Siciliana*. 1935. Sept. 15. Vol. 23. No. 18. pp. 1383-4, 1387-8, 1391-2, 1395. French summary (6 lines).

The author has examined the appendices removed from 15 persons who were found at the time (*i.e.*, just before operation) to be passing *E. histolytica* in their stools. He took the appendix in each case immediately after the removal and examined the contents fresh and stained and also sections of the walls. Fourteen were completely negative; in one preparation only of one of the patients he found motile forms of the Entamoeba. In another patient who was passing large numbers of them and whose appendix showed points of ulceration, he had great hopes of finding them, but found none. In no instance

was there any histological lesion attributable to the amoeba. He concludes that, in Catania at all events, appendicitis due to *Entamoeba* must be very rare.
H. H. S.

BONNIN (H.). La colite amibienne. [**Amoebic Colitis.**—*Gaz. hebdomadaire de Médecine de Bordeaux*. 1935. Sept. 1. Vol. 56. No. 35. pp. 546-553. [56 refs.]

A general review of the subject. The author divides the complications which are met with in intestinal amoebiasis into five groups; infective, toxic, parasitic (*i.e.*, concomitant presence of other protozoa such as *E. coli* and *Giardia lamblia* and also *Blastocystis hominis*), dystrophic (ulceration, cicatrization) and nervous and functional (dyspepsia, meteorism, abdominal pain, irregularity of bowel action, etc.). His clinical subdivision into latent amoebiasis (without symptoms), cases with constipation, with diarrhoea intermittent at intervals short or long, or almost constant, or less severe but chronic, is not very satisfying.
H. H. S.

CARLES (Jacques) & BONNIN (H.). Les colites amibiennes et post-dysentériques. [**Colitis, Amoebic and Post-dysenteric.**—*Jl. Méd. de Bordeaux*. 1935. Nov. 20. Vol. 112. No. 30. pp. 831-834.

A congress paper on general lines, chiefly from the clinical aspect. The authors divide the symptoms into four main groups: infective, often due to growth of secondary bacteria; toxic, from digestive disturbances and bacterial development; dystrophic and nervous, "entero-neuroses," and functional. The condition may be latent, producing practically no symptoms, or associated with constipation or diarrhoea or these alternating, and the diarrhoea may be intermittent, or chronic with abdominal pain situated anywhere along the colon or caecal region. The article is a fair summary of knowledge but introduces no new facts.
H. H. S.

TROWELL (H. C.). Loose Stools with Particular Reference to Amoebiasis. —*East African Med. Jl.* 1935. Nov. & Dec. Vol. 12 Nos. 8 & 9. pp. 229-234; 282-291; & 1936. Jan. No. 10. pp. 299-310. [25 refs.]

MOSTO (Domingo). Tres casos de perforación intestinal por amebiasis. [**Amoebiasis with Perforation of the Intestine.**—*Arch. Argentinos Enferm. Aparato Digest. y Nutric.* Buenos Aires. 1935. Aug.-Sept. Vol. 10. No. 6. pp. 541-562. With 16 figs.

Three cases are described, as regards history and post-mortem findings. The first was a man of 40 years who died at the time of admission while he was being examined. There is no statement as to the length of illness. Perforation was situated in the transverse colon; there was also an abscess in the right lobe of the liver. The second patient was a girl of 17 years who had been ill with vague symptoms—praecordial pain, palpitation, later oedema of legs, troublesome cough and loss of weight—for some 6-7 months, but a fortnight before admission suffered with intense pain in the left hypochondrium. Post-mortem revealed perforation at the base of the appendix and an ulcerative endocarditis. The third was a man of 40 who had suffered with dysenteric symptoms for some 15 years, more severely during the last

3 years. At autopsy he showed dysenteric ulceration of the caecum and colon, perforation in the descending colon and an amoebic abscess of the spleen. The article contains good photomicrographs.

H. H. S.

MAJUMDER (A. R.). **Atypical Manifestation of Amoebiasis.**—Reprinted from *Med. College Magazine*. 1935. Dec. Vol. 9. No. 2. 6 pp.

This article, though the fact is not stated, would appear to partake of the characters of a clinical lecture. A better title, in the opinion of the reviewer, would be "non-dysenteric manifestations and sequelae of amoebiasis." Attacks of dyspepsia, of sudden haemorrhage by the bowel, symptoms of appendicitis, even perforation may occur in patients in whom the amoebic infection was not suspected or had been forgotten. Hepatitis and pulmonary abscess are so well recognized as complications or sequelae that they are hardly to be classed now as atypical manifestations. The author writes "cerebral and splenic abscesses and also pyelitis, cystitis and epididymitis are caused by amoebic embolism," but no references are given in support of this. Again, is it quite correct to class "bacterial leak . . . sometimes responsible for subacute arthritis, synovitis, myositis and perineuritis" and cases of epidemic dropsy whose stools show amoebic cysts, or "leucoderma . . . associated with chronic amoebiasis" as constitutional effects of chronic amoebiasis or as atypical manifestations of amoebiasis? Arthritis, neuritis and some other complications mentioned are more common in bacillary than amoebic dysentery and may be due to the double infection as well as to a leak of *Streptococcus viridans* via intestinal lesions caused by *E. histolytica*. The author regards the anaemia of pregnancy as due to "deficiency of the red cell maturing anti-anaemic principle and one factor at least is chronic amoebiasis."

H. H. S.

REED (Alfred C.) & ANDERSON (Hamilton H.). **Amoebiasis and Cancer of Colon.**—*Amer. Jl. Med. Sci.* 1936. Feb. Vol. 191. No. 2. pp. 237-250. With 8 figs. (4 on 2 plates). [10 refs.]

An interesting account of four patients, one man and three women, of ages ranging between 40 and 49 years, in whom carcinoma developed upon amoebic infection of the colon. The duration of the amoebiasis was from 3 to 10 years; two had had no previous treatment for the amoebiasis, the condition having been undiagnosed; one had had intensive early treatment, the other late, with emetine. The authors urge that in view of this possible malignant development X-ray examination and barium enema should be carried out in all cases of recurring amoebic dysentery. There are two ways, possibly more, in which amoebiasis may be succeeded by carcinoma: irritation and reaction (not that there is not some subsidiary factor, see below); growth, polypoid and adenomatous, being set up, these being tumours which readily become malignant.

They postulate several possibilities as regards these predisposing, concomitant or subsidiary factors, which call for further study.

"Is there some predisposing factor which facilitates the development of chronic ulcerative colitis and cancer, as a sequel and complication of amoebiasis? Do vitamin G and the intrinsic gastric hormone play a part

in this predisposition? Is there a relationship here to the frequently noted importance of high vitamin diet in the treatment of amoebiasis? Does the course of the disease and the eventual occurrence of malignancy, or the obscure chronic increasing lesions of amoebiasis depend on or have relation to, deficiency of vitamin G, or vitamin B? Do these same factors have any bearing on the sequential relation of cancer to amoebiasis?"

H. H. S.

McMULLIN (J. J. A.). Amoebiasis and its Surgical Complications.—*U.S. Nav. Med. Bull.* 1935. July. Vol. 33. No. 3. pp. 313-324.

CASTELLANI (Aldo). Three Clinical Signs useful in the Diagnosis of Chronic Amoebic Colitis.—*Jl. Trop. Med. & Hyg.* 1935. Nov. 1. Vol. 38. No. 21. pp. 267-268.

The classical symptoms of chronic amoebic colitis—diarrhoea with blood and mucus—are often absent, and the entamoeba may be looked for day after day in vain. The author mentions a case where no amoebae or cysts or Charcot Leyden crystals were seen in 89 consecutive daily examinations, but positive results were obtained on the 90th day. He mentions three clinical physical signs due to affection of the liver in latent or very mild amoebic colitis, though hepatitis, fever and leucocytosis are absent. The first two signs are elicited with the patient recumbent. (1) Percussion from the umbilicus to the ensiform cartilage results in production of pain when the percussion reaches immediately below the ensiform cartilage. Pressure will elicit the same sign. The pain of duodenal ulcer or hyperchlorhydria is usually lower along this line, while that due to cholecystitis is to the right of it. (2) The midaxillary line is marked with a pencil; from a point 4 cm. below the nipple a line is drawn horizontally to meet the former line at a right angle. The sign is dulness to firm percussion at the spot where these two lines meet and for a short distance outside it. (3) With the patient sitting up in bed a band of dulness is present at the right base and tactile fremitus there *may* be increased. This is ascribed to an enlarged liver thrusting up the diaphragm and giving the signs of partial consolidation of the lung adjacent.

The author states that in his experience the first sign is present in some 15 per cent. of such cases of amoebic colitis with little or no other indication; the second in 20 per cent. and the third in 10 per cent. The combination of two is very suggestive and three almost diagnostic.

H. H. S.

TRABAUD (J.). Les aspects médicaux de l'amibiase en Syrie. [**Amoebiasis in Syria: its Medical Aspects.**]—*Jl. Egyptian Med. Assoc.* 1935. Sept. Vol. 18. No. 9. pp. 579-589. [26 refs.]

Malaria, trachoma, Aleppo boil, three-day fever and amoebiasis are the chief diseases of Syria, says Professor Trabaud, but, if we take into account latent manifestations, the greatest of these is amoebiasis. Few escape infection, whether Europeans or natives, because vegetables are contaminated and the dust of the road contains the cysts in dried faecal deposits. The baby at the breast is infected from the soiled hands of the mother. The author then relates anomalous symptoms associated with the presence of amoebae or cysts in the stools, clearing up on treatment with emetine, stovarsol, etc. Apart

from clinical dysentery and liver pain due perhaps to amoebic cholecystitis, he mentions pulmonary or liver abscess, cystitis, pyelonephritis, meningitis, mental disturbance, anxieties, phobias and so forth. [It seems a slight misuse of terms to classify these as latent forms of amoebiasis.]

H. H. S.

WALDORP (Carlos P.). Amebiasis y anemias graves. Consideraciones sobre la anemia "perniciosaiforme" en la amebiasis.—*Prensa Méd. Argentina*. 1935. Nov. 13. Vol. 22. No. 46. pp. 2215-2222. With 2 figs. [16 refs.]

BROWN (Philip W.). Results and Dangers in the Treatment of Amebiasis. A Summary of Fifteen Years' Clinical Experience at the Mayo Clinic.—*Jl. Amer. Med. Assoc.* 1935. Oct. 26. Vol. 105. No. 17. pp. 1319-1325. [18 refs.]

This is an instructive summary of a fairly wide experience in the treatment of amoebiasis. The article is divided into three sections, apart from some introductory remarks. The first considers the drugs commonly used in this condition, *viz.*, emetine hydrochloride, treparsol, acetarsone, arsphenamine, chiniofon (yatren), ipecacuanha, bismuth emetine iodide, vioform, and carbarsone, but except with the first three the number of patients treated was too small for valid inference. Emetine hydrochloride was given to 554 patients, and ill effects shown in some were peripheral neuritis, palsy and cardiovascular disturbances, rapid pulse, asthenia, vomiting and diarrhoea. Eight presented these symptoms in a fairly marked degree and another eight in mild form. Acetarsone (stovarsol) was used in 232 cases without a death (though others have recorded fatalities from its use); 13 suffered from severe toxic erythema, some so severe as to amount to dermatitis exfoliativa; one patient had serious peripheral neuritis which did not clear for nearly a year. Three hundred and one were given treparsol; 8 showed a toxic erythema, four at the end of the first course of 3-3.75 gm., four during or at the end of the second course of 3 gm.; the symptoms subsided in 3-5 days. Yatren was used in 37 cases only and vioform in 18.

The second section deals with the results of treatment. On this there is not much to say here for "cure" is "used to imply that not less than two examinations of stools were made on successive days following completion of treatment" though it is stated that "in most cases repeated examinations were made over a period of months to several years." [The results would have been more informative if only those were regarded as cured in whose faeces the amoeba could not be found in repeated examinations after a purge, during a period of six months or so.] Better results were obtained with arsenicals and the combined treatment of emetine and arsenical was found to succeed in patients who had resisted either singly. In fact, emetine has come to be regarded as suited to control the acute symptoms only. "Varying the ammunition immunizes reactions to the drugs," states the author, "and seems more effective in finally obtaining a cure . . . the barrage of arsphenamine, emetine, bismuth emetine iodide, chiniofon, carbarsone, acetarsone, treparsol, vioform and ipecac. is indeed startling, and one asks what good any one drug is when such a variety is used." In many, however, a cure was finally obtained even to very resistant infections.

Finally, the author briefly states the present methods of treatment which he employs.

"If the patient has not received antiamebic treatment recently, he is given 0.065 gm. (1 grain) of Burroughs, Wellcome & Co. emetine hydrochloride, subcutaneously, twice daily for three days. After an interval of a week, 0.043 gm. (two-thirds grain) of emetine is given twice daily for three more days. With the institution of the emetine, treparsol, 0.25 gm. (4 grains), is administered orally with each meal for four days. If there is no intolerance to arsenic, two more such courses are prescribed with intervals of ten days between the courses."

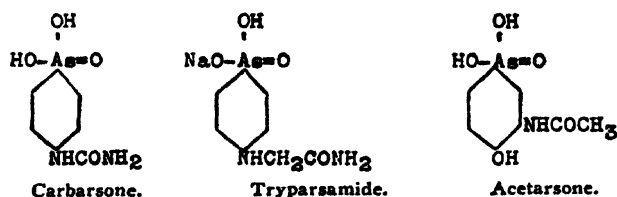
"If stool tests are positive following this regimen, three courses of chiniofon are prescribed: 3 gm. orally per day for a week and repeated for two more such courses, with a week's interval between courses. If diarrhoea is increased, the daily dose is decreased, thereby prolonging each course. Failure after this would indicate a course of one injection of arsphenamine weekly for six weeks, and 1 drachm (3.88 gm.) of bismuth subnitrate from three to six times daily during the period."

H. H. S.

EPSTEIN (Ervin). **Toxicity of Carbarsone. Acute Fatty Degeneration of the Liver, Exfoliative Dermatitis and Death following its Administration.**—*Jl. Amer. Med. Assoc.* 1936. Mar. 7. Vol. 106. No. 10. pp. 769-772.

In view of the fact that carbarsone is used in the treatment of amoebiasis and is generally thought to be comparatively innocuous, at all events in the doses usually employed, this record is of considerable importance.

Carbarsone or P-carbaminophenylarsonic acid ($H_2O_3AsC_6H_4NHCONH_2$) contains 28.8 per cent. arsenic acid and is supplied in capsules containing 0.25 gm. Seeing that it is closely allied to tryparsamide and acetarsone (stovarsol) (see formulae), it is surprisingly non-toxic.



The case recorded is the first fatal case which the author has been able to find recorded. A woman of 55 years suffered from anorexia and diarrhoea (8-10 motions daily) for several months and in spite of varied treatments obtained no relief. The stools revealed *Giardia* in large numbers, but no other abnormality. Her last treatment before coming to hospital was carbarsone of which she took 5 gm. in 10 days; 2.5 gm. was given in enemas but these were not retained. She received altogether 83.3 mgm. per kilogram body weight. On admission the mucosae were pale, the skin dry, erythematous and covered, especially the legs, with a scaly eruption; the hair was dry, grey and lustreless. There was considerable anaemia: r.b.c. 2,640,000, Hb 46 per cent. (Sahli), leucocytes 5,650 per cmm. She progressed to a certain degree

for 10 days under treatment, which included a transfusion of 500 cc. citrated blood. After that she became worse, the diarrhoea continued (4 actions daily), jaundice supervened, the liver enlarged and death occurred 15 days after admission. The chief finding at autopsy was an enlarged, smooth, yellow, fatty liver, containing 65 per cent. fat by weight and 0.03 mgm. of arsenic per 100 gm. tissue. The kidneys showed some tubular necrosis.

Previous writers have recorded a dosage of carbarsone ranging to 2,100 mgm. per kilogram over a period of 15 months; others to 1,200 mgm. over 48 weeks, so this patient with a total of 83.3 mgm. apparently died after a therapeutic dosage which is recommended to be given 5 gm. over a 10-day period. Experiments in the laboratory animals—guinea-pigs, rabbits, and cats—show the minimum lethal doses to be 150, 200 and 200–250 mgm. per kilo respectively, and when death occurs they show tubular necrosis of the kidney, as did the patient above. This drug is, therefore, not free from risk in therapeutic doses and if there is any doubt it would be well to make the usual tests for liver function since damage to this organ must be regarded as a contraindication to its administration [see this *Bulletin*, 1934, Vol. 31, p. 282]. H. H. S.

EL-BIBLAWI (A.). The Treatment of the Different Forms of Dysentery and Other Intestinal Disorders.—*Jl. Egyptian Med. Assoc.* 1936. Jan. Vol. 19. No. 1. pp. 39–44.

The author records a number of cases of colitis, dysenteric, catarrhal and muco-membranous, treated with entero-vioform, an oxyquinoline derivative. It has, he states, advantages over emetine in that it does not affect the vomiting centre nor the heart. He gives details of cases of chronic dysentery of 5–10 years, and mentions 15 cases of acute amoebic dysentery, and others with chronic catarrhal colitis, with tenesmus and passage of blood and mucus, all benefiting greatly and most being cured (up to the time of recording) after a course of entero-vioform.

In acute disease in adults he gives 3 tablets (each of 0.25 gm.) daily after food for ten consecutive days; in chronic cases in addition to this he gives as an enema at bedtime 2 tablets in 250 cc. tepid water, after a wash out, the enema being, if possible, retained all night. After 12 days' treatment 5 days' rest is allowed, and then oral treatment only is given for another week. The dose for children is 0.01 to 0.02 gm. per kilo. daily for a week. [The composition of the drug is not mentioned.]

SAYID (Ibrahim Abdel). Auricular Fibrillation after Emetine Injection.—*Lancet.* 1935. Sept. 7. p. 556.

Cardiac irregularity is well known as one of the toxic effects of emetine, but the author here puts on record two cases, a woman aged 40 and a man of 50 years, each suffering from amoebic dysentery, to whom he gave emetine hydrochloride subcutaneously. The woman had mitral regurgitation, a sequela of an attack of rheumatic fever, and to her was given 1/3 grain daily for 6 days; the man's heart was apparently healthy, he had 1 grain daily for 6 days, repeated after a 10 days' interval. Both patients developed severe auricular fibrillation necessitating the administration of digitalis. H. H. S.

ROSEN (Eli A.), MARTIN (R. R.) & DAVID (Norman A.). **Cumulative Toxicity of Emetine Hydrochloride in Guinea Pigs.**—*Proc. Soc. Experim. Biol. & Med.* 1935. Nov. Vol. 33. No. 2. pp. 289–291.

This series of experiments was undertaken to determine whether the subcutaneous administration of small graded doses of emetine hydrochloride led to cumulative toxicity. Guinea-pigs were the experimental animals, and as LD₅₀ has been shown to be approximately the same for many laboratory animals and 20 mgm. per kilo the LD₅₀ for white rats, this was chosen for the present study. Seventy animals were injected, ten having saline only, to serve as controls. The following table gives the results :—

Cumulative Toxicity of Emetine Hydrochloride in Guinea Pigs.

No. of doses	Mg./Kg. per dose	Mortality Ratio. No. dying/No. used	Average time of death, days from first injection
1	20	6/20	6·7
2	10	5/10	22·4
5	4	5/10	20·4
10	2	4/10	17·8
20	1	5/10	32·4
20	saline	0/10	—

From this it appears that the drug has a cumulative toxicity when injected in doses as small as 1/20 MLD. With the reservation that deductions from small numbers are to be regarded as unsure, it may be noted that the toxicity from repeated divided doses was even greater than that following a single dose of equal total amount. By inference, repeated doses should be given cautiously to human subjects.

H. H. S.

CHOPRA (R. N.), SEN (B.) & SEN (G.). **Amibiarsen in the Treatment of Chronic Intestinal Amoebiasis.**—*Indian Med. Gaz.* 1935. June. Vol. 70. No. 6. pp. 324–328.

The authors comment on the disappointing results obtained with most drugs in the treatment of chronic intestinal amoebiasis. Emetine is almost useless after the acute stage, for it is too toxic to permit of its being taken in amount sufficient to reach the parasites deeply seated in the tissues. Oxyquinoline derivatives such as yatren, chinfoform, vioform, though reputed to be highly amoebicidal, often fail to cure; rivanol and bismuth have failed, Kurchi bark is good, but properly matured and dried bark is necessary and alkaloids obtained from indifferent quality bark prove a failure. Stovarsol and treparsol are not very effective. Carbarsone, introduced by Lilly and Co. of Indianapolis, U.S.A., has proved very efficacious in the authors' hands [see this *Bulletin*, 1934, Vol. 31, p. 282]. It is less toxic than stovarsol, is a stronger amoebicide and its therapeutic index is about 8 times as great.

A new compound, amibiarsen, has been prepared by the Bengal Chemical and Pharmaceutical Works, Calcutta, having a chemical composition very similar to carbarsone (4-carbamino phenyl arsenic

acid) and is administered in the same way, 0.25 gram in gelatine capsules twice a day *per os* for 10–15 consecutive days. The patients are on ordinary diet, and a saline purgative is taken with the amibiarsone. Cure is recorded when six or more consecutive stools have been examined on different days and found negative as regards presence of *E. histolytica*.

Of 40 patients who received this treatment 25, or 62.5 per cent., were cured; in 10 (25 per cent.) the result was indeterminate and in 5 (12.5 per cent.) it failed. The "indeterminates" showed much general improvement, but left hospital before the usual six examinations had been completed. The ratio of probable cures to failures was, therefore, 5 : 1; with carbarsone it was 5.7 : 1. H. H. S.

To (Sōmei) & Kyū (Kenten). Sechs weitere Fälle von Amöbendysenterie mit Carpain behandelt. [**Six More Cases of Amoebic Dysentery treated with Carpain.**]—*Taiwan Igakkai Zasshi* (Jl. Med. Assoc. Formosa). 1935. Dec. Vol. 34. No. 12 (369). [In Japanese pp. 2063–2068. German summary p. 2069.]

In 1934 the authors treated a case of amoebic dysentery with carpain by way of experiment and obtained complete cure. They now record six more cases. Four were in the acute stages with fever, stools containing blood and mucus and showing amoebae. After 5–7 injections of carpain [the dose is not mentioned] the blood, mucus and amoebae disappeared and subjective symptoms cleared up. The other two had received treatment with emetine, but without success and the condition had become chronic. In these the carpain injections were followed by amelioration of symptoms and the amoebae in the stools were fewer, but cysts still were visible. The administration of yatren *per os* in addition to the carpain by injection brought about a cure with disappearance of the cysts.

Except for a local inflammatory reaction at the site of injection, which disappeared by the following day, no ill effects were observed in any of these six patients. The first patient treated with carpain had reacted strongly, with inflammation and oedema of the limb, this, in the authors' opinion, was due to the fact that the patient was a worker in metal and they think his occupation was in some way responsible.

H. H. S.

CASTELLANI (Aldo). **The Treatment of Amoebic Colitis with Iodoform.**—*Jl. Trop. Med. & Hyg.* 1935. Nov. 1. Vol. 38. No. 21. pp. 268–269.

The author speaks highly of the results following the use of iodoform in subacute and chronic cases of amoebic colitis. The patient stays in bed and is given a very light or fluid diet, and after a purge of magnesium sulphate iodoform is given in keratinized capsules each containing 0.05 gm. ($\frac{1}{2}$ grain), one or two 3–4 times daily for 12–15 days. After an interval of a week the course may be repeated. The drug may also be given by enema 0.2–0.3 gm. in 300 cc. water. Nine cases are referred to and two are detailed. In one the amoebae disappeared on the 4th day and in the other on the 6th day after the treatment was started. Only one patient showed any toxic symptoms, and he complained merely of slight vertigo on the twelfth day. H. H. S.

DYCKERHOFF (Hedwig). Ueber Leberschädigung durch Yatren. [**Damage to the Liver after Yatren.**]—*Muench. Med. Woch.* 1935. Nov. 8. Vol. 82. No. 45. pp. 1802-1803. With 1 fig.

Cases of injury to the liver have been reported as following intravenous administration of yatren. The lesions found bear a strong resemblance to those of subacute yellow atrophy as seen in arsenic and chloroform poisoning. The author carried out experiments with rabbits using a 5 per cent. solution of yatren. In normal animals very little change was set up in spite of the doses being higher correspondingly than is used in man. If, however, by dietetic means the glycogen content of the liver is reduced, then doses previously innocuous set up the condition described. Under certain circumstances, therefore, intravenous injection of yatren can lead to serious disturbance of the liver and it is incumbent upon us to forestall this by careful preliminary examination and determination of the bilirubin content of the blood.

H. H. S.

FAUST (Ernest Carroll) & SWARTZWELDER (John Clyde). **Use of Liver Extract Intramuscularly in the Course of Acute Amebiasis in Dogs.**—*Proc. Soc. Experim. Biol. & Med.* 1936. Jan. Vol. 33. No. 4. pp. 514-518.

The authors have previously recorded the effects of raw liver and powdered liver extract on *Entamoeba histolytica* in dogs experimentally infected, when the liver is administered *per os*. In the present article they give an account of the use of the extract when injected intramuscularly in dogs similarly infected. In 6 animals a commercial Parke, Davis & Co.'s product was used; in another 8 a fresh liver extract prepared by themselves. One cc. was equivalent to 5 gm. of fresh pig's liver. It was administered alternately into right and left gluteal regions in doses of 2 cc. The infecting protozoa were a human strain after passage through several dogs. In all of the experimentals (with one exception, a dog which had probably received an inadequate amount of the extract) the erythrocyte count was high and the Hb percentage fair, usually over 50 and in some 80, in spite of the loss of blood by the bowel. Other dogs not receiving liver showed decrease in r.b.cs. so the increase was not due merely to loss of fluid. In spite, however, of the blood changes the effect on the entamoeba was slight or nil when thus administered intramuscularly—markedly contrasting with the results of oral administration. It is concluded that "the fraction of raw liver which is efficacious as an amoebostatic agent is either different from that which prevents erythropoiesis, or that its amoebostatic action is inhibited when it is introduced intramuscularly." [See also this *Bulletin*, 1931, Vol. 28, p. 793; 1932, Vol. 29, p. 586; 1935, Vol. 32, pp. 191, 777.]

H. H. S.

MASSIAS (Charles). Hépatite amibienne suppurée, à propos de dix-neuf cas personnels, traitement émétinien, la question des abcès du foie non amibiens.—*Bull. Soc. Méd.-Chirurg. Indochine.* 1935. Dec. Vol. 13. No. 10. pp. 1625-1636. [35 refs.]

HUARD (P.) & MAY (Meyer). Traitement des abcès du foie.—*Bull. Soc. Méd.-Chirurg. Indochine.* 1936. Jan. Vol. 14. No. 1. pp. 76-149.

MILLISCHER. Considérations sur la thérapeutique médicale actuelle de l'amibiase.—*Jl. Egyptian Med. Assoc.* 1935. Aug. Vol. 18. No. 8. pp. 553-563.

HELMINTHIASIS.

MUSGRAVE (J. A.). **Intestinal Worm Parasites in Relation to Public Health.**—*Med. Officer.* 1935. Dec. 14. Vol. 54. No. 24. pp. 245-247.

The dry system of conservancy is associated in Louth, Irish Free State, with high infections by ascaris and trichuris.

To direct smear of 242 faecal specimens, 60 showed ascaris eggs, 130 trichuris eggs and 151 both sorts. In streets with dry conservancy the percentage of infective children was 62. "Some 60 samples have been obtained to date from children who have been long domiciled in streets furnished with water flush closets and show a comparatively small percentage of worm infestations." [Surely a striking commentary on the confident dictum that practically any latrine if used will prevent ascaris infection.] Clayton Lane.

VO CAN CAN (M.). L'helminthiase chez les enfants de la région provençale. [**Helminthiasis among Children in the South of France.**]—*Bull. Soc. Path. Exot.* 1935. Nov. 13. Vol. 28. No. 9. pp. 829-832.

The stools of 200 children in Marseilles hospitals were examined, and the findings reported.

The stools were examined macroscopically, by 2 smears measuring 50 by 22 mm., and by a Telemann-Langeron concentrative method.

One hundred and fifty of the children had never left the country; their percentages of infection were: trichuris 73.33, ascaris 10, enterobius 3.33, *H. nana* 1.33, "*A. duodenale*" 0.66; 34 of them showed no ova.

Fifty children had been abroad and had these percentages of infection: trichuris 68, ascaris 30, enterobius 12, *H. nana* 6, "*A. duodenale*" 2; 10 showed no ova.

On 100 lettuce there were seen trichuris eggs 3 times and ascaris eggs 4 times. C. L.

KALANTARIAN (H. W.). Die Helminthosen der Bevölkerung von SSR Armenien und ihre Dynamik von 1924 bis 1933. [**Helminthiasis in Armenia.**]—*Arb. d. Tropeninstituts d. Volksgesundh. Kommissariat d. SSR. Armenien.* 1935. Vol. 2. [In Russian pp. 348-349. German summary pp. 376-377.]

The work has covered 10 years. The method of faecal examination is unstated. Hookworms and schistosomes are not endemic. Of 5,791 adults 96.3 per cent. are wormy, and of 4,604 children 90.6 per cent. Trichuris infection is present in 85.6 per cent. and seems to be getting larger, ascaris in 67.3 per cent. Trichostrongylus has lessened—in children from 14.2 to 0.5 per cent. *Taenia saginata* has risen from 11.9 to 27.5 per cent. in adults and from 5.7 to 8.6 per cent. in children. *H. nana* is increasing, in one school being as high as 26 per cent. Treatment puts infection with enterobius at 87 per cent. There were also seen *H. diminuta*, *D. caninum*, *E. granulosus*, *T. solium*, *S. stercoralis*, *F. hepatica* and *D. dendriticum*. C. L.

FOY (Henry) & KONDI (Athena). **A Note on a Faeces Survey in a Rural Greek Population of a Peloponnesian Village.** [Research Note.]—*Jl. Parasitology*. 1935. Dec. Vol. 21. No. 6. pp. 451-452.

"During the period of inter-regnum between two blackwater fever seasons a limited survey was made of the parasite content of the faeces of the inhabitants of a village on the southern shores of the Gulf of Corinth in the Peloponnesus. In all 200 specimens of faeces were examined. Two smears were made from each, one in normal saline, and the other in a solution of iodine in potassium iodide. The whole field under a 5×3 cm. cover slip was searched with the low power; anything suspicious was examined further by the high and dry, or the oil immersion. Concentration of the faeces by the method of Clayton Lane failed to reveal any hookworm eggs. The total parasite rate for the whole village was found to be 72 per cent. The infection rate among the males and females was not significantly different, being 76 per cent. among the females, and 68 per cent. among the males.

"Below are summarized the findings for the various parasites :—

"*E. histolytica* (cysts) 10 per cent.; *E. coli* (cysts) 13 per cent., *Lambli*a (cysts) 8 per cent., *Iodamoeba* (cysts) 6 per cent., Ascarids (eggs) 29 per cent., Trichurids (eggs) 42 per cent., Taenias (eggs) 2 per cent., Trematodes (eggs) 5 per cent., *Enterobius* (eggs) 1 per cent., *Hymenolepis* (eggs) 3 per cent., *Dipylidium* (eggs) 1 per cent., Non-classified 12 per cent.

"In the various age groups the infestation was distributed as follows :—

Age group	Males	Females
1 to 5 years	66 per cent.	66 per cent.
6 to 10 "	80 "	92 "
11 to 14 "	66 "	77 "
15 +	64 "	66 "

"Among those carrying parasites in their faeces there occurred the following distribution: double infections, 37 per cent.; triple infections, 12 per cent.; quadruple infections, 3 per cent.; quintuple infections, 1 per cent. The village had a spleen rate of 50 per cent. (Malaria) in 1933: kala-azar was prevalent, but the rate of infection was not known."

BASNUEVO (Jose) & ANIDO (Vicente). La solución aceto-formo-azucarada en el enriquecimiento de huevos de parásitos en las heces fecales. [**Concentration Method for examining Faeces for Helminth Ova.**]—*Medicina de Hoy*. Habana. 1936. Mar. Vol. 1. No. 2. pp. 49-50. With 1 fig.

The authors employ the following solution: Acetic acid 100 cc., formol 100 cc., cane sugar 550 gm., water to a litre. The mixture is shaken thoroughly till the sugar is dissolved and then filtered. Their technique is to place 15 cc. of the fluid in a test-tube and add approximately 1 gm. of faeces, cork and shake vigorously for about 3 minutes, then pass through a fine sieve and collect the filtrate by means of a

funnel into a small 15 cc. glass receptacle [in the illustration this resembles a medicine glass in shape], fill to the top with the sugar-formol-acetic solution and leave for 30-40 minutes. Then place a coverslip in contact with the surface and transfer to a slide for examination. By this method Ankylostome, Trichuris and fecundated Ascaris are concentrated; unfertile Ascaris eggs rarely; Taenia and Hymenolepis are fairly well concentrated and also coccidia, but not *Fasciola hepatica*, nor protozoa.

H. H. S.

TAKASAKI (J.). **Prevalence of Intestinal Parasites, particularly of Hookworms in Saitama Prefecture and its Prevention Work.**—*Jl. Public Health Assoc. Japan*. 1935. Oct. Vol. 11. No. 10. pp. 1-12.

The survey covers 874,680 persons examined during 13 years by "Yaoita's antiformin ether method" by the same staff. The percentages of infection were: totals 75.6, hookworm 34.7, roundworms 58.4, whipworms 23.1, trichostrongylus 1.4, threadworms 0.5, liver distomes 0.8, *H. nana* 0.02, *H. diminuta* 0.01; and a few had metagonimus. Cure rates after treatment are put as 46.6 after thymol [mention of any essential particulation being omitted], 50 after "nematol" and 69.4 after "parasitol." Repeated treatments at intervals of 1 to 3 years were followed by progressive lessening of infection, there being no mention at all of any accompanying sanitation. Infection did not produce any recognized loss of physique.

C. L.

CALVO FONSECA (Rafael), KOURÍ (Pedro) & BASNUEVO (José G.). Porcentaje y distribución geográfica del parasitismo intestinal en Cuba. [**Intestinal Parasitism in Havana.**—*Vida Nueva*. 1935. Dec. 15. Vol. 36. No. 6. pp. 629-635.]

The authors examined the faeces of 1,797 individuals in the town of Havana with a view to determining the prevalence of parasites, helminthic and protozoal. Of the total 655 or 36.4 per cent. were positive; 12.8 per cent. had protozoa only, 6.4 had helminth infestations also, and 17.3 worms only. There were 1,267 children and of these 479 or 37.8 per cent. harboured parasites; among the 530 adults 176 or 33.2 per cent. Of the helminthic infestations the commonest was Trichuris (19.2 per cent.), next Ascaris (6.9), Enterobius (1.4) and Necator (0.8 per cent. only). Of protozoa *E. coli* was seen in 12.2 per cent., *G. intestinalis* in 7.6, and *E. histolytica* in 1 per cent. There was practically no difference as regards sex; among the females 37.1 and among the males 36.6 per cent. were infected. The authors state: "The examination for protozoa was not thorough, the chief object being determination of helminths. We have not recorded *Chilomastix mesnili*, *E. nana*, *Trichomonas hominis*, which are fairly common in Cuba." [The authors also omit to give their method of examination, either for protozoa or helminths.]

H. H. S.

KOURÍ (Pedro), CALVO FONSECA (Rafael) & BASNUEVO (José G.). Porcentaje y distribución geográfica del parasitismo intestinal de Cuba. Provincia de la Habana. [**Intestinal Parasites in the Province of Havana, Cuba.**—*Medicina de Hoy*. Habana. 1936. Mar. Vol. 1. No. 2. pp. 32-36.]

The authors examined altogether 3,446 faecal specimens [method not stated], of which 1,797 were inhabitants of the town of Havana and the

remainder in 26 adjoining districts. They found 1,637 or 47·5 per cent. positive [the total is at variance with details given later]. Protozoa were not specially looked for but recorded when seen. *E. coli* was found in 508 or 14·7 per cent., *Giardia lamblia* in 208 or 6·0 per cent., and *E. histolytica* in 38 or 1·1 per cent.

Recording the findings by prevalence in sexes, it is stated that of 1,524 females 741 or 48·6 per cent. were passing ova or parasites and 596 or 45·2 per cent. of 1,318 males [this would give a total of 1,337 positive among 2,842 examined]. In their summary the authors state that protozoa alone were found in 303, protozoa and helminths in 204, worms only in 826. Trichuris was the most frequent, being present in nearly one-third of the total, Ascaris next 11·6 per cent., Necator 2·5, Enterobius 1·6.

H. H. S.

FAUST (Ernest Carroll) & HEADLEE (William Hugh). Intestinal Parasite Infections of the Ambulatory White Clinic Population of New Orleans. —*Amer. Jl. Trop. Med.* 1936. Jan. Vol. 16. No. 1. pp. 25–38. With 2 figs.

RAMSAY (G. W. St. C.). A Study on Schistosomiasis and Certain Other Helminthic Infections in Northern Nigeria.—*West African Med. Jl.* 1934. Oct. Vol. 8. No. 2. pp. 2–10 and 1935. Jan. No. 3. pp. 2–7. With 4 graphs. [31 refs.]

The author's summary adequately states the results of his investigations :—

" 1. The advantages and limitations of the cutaneous test for bilharzial infection have been discussed. It has been concluded that the test cannot replace diligent examination of the excreta, but rather that both methods of diagnosis should be employed where possible.

" 2. The results obtained with the cutaneous test at different ages show that there is a rapid rise in the proportion of positive reactions until the age of about eleven years and that thereafter there is a slight but progressive fall.

" 3. It has been shown that vesical schistosomiasis has been diagnosed in nearly thirty-two per cent. of all cases, and that among children it was found in proportions varying from sixteen to eighty-four per cent. Intestinal schistosomiasis was proved in fifteen per cent. of all cases, the incidence among children ranging from nine to thirty-nine per cent. It has also been shown that the cutaneous test for bilharzial infection was positive in sixty-seven per cent. of all cases with extremes ranging from thirty-five to eighty per cent. in different localities. Finally, it has been recorded that in certain places the mallams state that every boy at some time in early life suffers from gross haematuria. Together, these observations form a chain of evidence which inevitably implies the conclusion that schistosomiasis is rampant in Northern Nigeria, and in some places well-nigh universal. Vesical schistosomiasis is apparently the more prevalent form of the disease, but the intestinal form is also common—probably more common than our results have indicated.

" 4. Hookworm and tapeworm infestations are common. In a total of 550 cases examined by the D.C.F. technique eighty-nine per cent. were found to be excreting hookworm eggs. *Necator americanus* and *Taenia saginata* are the prevailing species of these parasites.

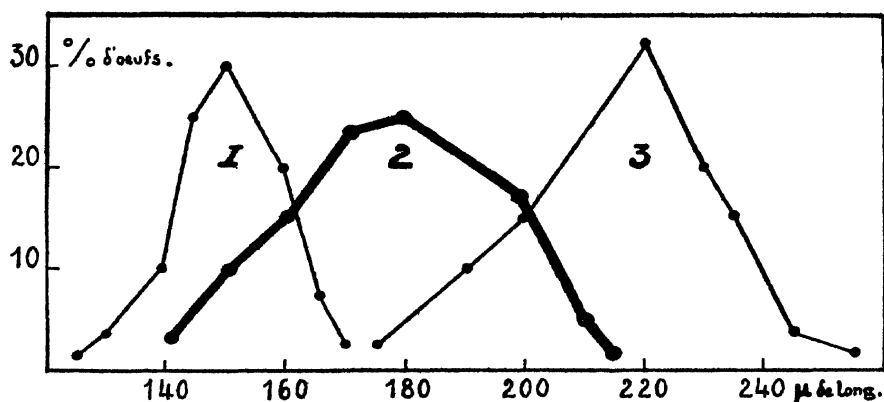
" 5. It has been emphasised that although the native seldom complains of symptoms due to his helminthic parasites (apart from guinea-worm) there is no justification for regarding them as harmless commensals because their presence must of necessity be a constant drain on the reserves of the host.

"6. The influence of the age of the host on the excretion of eggs of *B. haematobia*, *B. mansoni*, and *H. nana* has been studied. It has been shown that during the first few years of life there is a rapid rise in the proportion of persons excreting ova followed by a fall which takes place at first rapidly and then more slowly as age advances. Evidence has been offered in support of the view that this fall operates in accordance with some natural law and that it may perhaps be associated (at least in part) with the density of the parasite population within the host.

"7. *Planorbis pfeifferi* has been proved to be a natural intermediate host of *B. mansoni*; *Physopsis globosa*, *Bulinus tchadiensis*, and perhaps *Bulinus angolensis* being the intermediate hosts of *B. haematobia*." C. L.

VAN DEN BERGHE (L.). Sur le polymorphisme des oeufs de *Schistosoma haematobium* et la présence d'oeufs du type bovin dans les infections de l'homme au Katanga (Congo Belge). [Polymorphism of Ova of *Schistosoma haematobium*. Ova in Human Infections in Katanga (Belgian Congo) resembling those of *Sch. bovis*.]—*Bull. Soc. Path. Exot.* 1936. Jan. 8. Vol. 29. No. 1. pp. 41-46. With 2 figs.

When drawings and measurements were made of large numbers of the eggs of *S. haematobium*, van den Berghe found much difference in the sizes and shapes of eggs, a difference little evident when they were merely looked at under the microscope.



Curves showing the percentages of eggs in relation to their length: 1, in a normal urinary infection in man with *S. haematobium* alone; 2, in a "mixed" infection in man in which eggs of both *haematobium* and *mattheei* type were present, and 3, in a case of bovine schistosomiasis in an animal with *S. mattheei* alone.

[Reproduced from the *Bulletin de la Société de Pathologie Exotique*.]

The paper makes contacts with the work of BLACKIE [this *Bulletin*, 1932, Vol. 29, p. 401] in Southern Rhodesia, and of FISHER [this *Bulletin*, 1935, Vol. 32, p. 239] from the Katanga area itself which dealt with terminal spined eggs of a particular kind seen in human *faeces* to which FISHER gave the name *S. intercalatum*. But van den Berghe's report is that in the *urine* of man in Katanga a like condition was seen in 6 of 176 persons who had symptoms of urinary schistosomiasis, and he gives these overlapping curves (see Fig.), regarding which comparison should be made with those which were reproduced from FISHER's paper. Van den Berghe's own conclusion is that the 3 curves are indicative of an infection with polymorphic schistosomes, but that this can be settled only by infection experiments.

C. L.

CALLOT (J.). Note sur la bilharziose dans le caïdat des Nefzaoua (Tunisie). [**Schistosomiasis in Nefzaoua (Tunis).**]—*Ann. Parasit. Humaine et Comparée*. 1935. Nov. 1. Vol. 13. No. 6. pp. 533-536.

A note on the local distribution of *S. haematobium* and *B. contortus*.

C. L.

BROC & MAMI (A.). Schistosomiase intestinale. [**Intestinal Schistosomiasis.**]—*Tunisie Méd.* 1935. Dec. Vol. 29. No. 10. pp. 477-478.

Intestinal infection with *S. haematobium* which was possibly got at Matmata. In addition eggs and blood were present in the urine. C. L.

GIROLAMI (Mario). La profilassi della schistosomiasi nell'Africa Orientale. [**Prophylaxis of Schistosomiasis in East Africa.**]—*Arch. Ital. Sci. Med. Colon.* 1935. Dec. Vol. 16. No. 12. pp. 844-852. With 1 map.

The author brings evidence from the literature to show that schistosomiasis is widespread in Italian Somaliland. Though *Bulinus* is not recorded, *Planorbis*, *Ampullaria* and *Blanfordia* are abundant. The vesical form of schistosomiasis is believed to exist throughout Abyssinia, though to what degree is not known with any certainty. Indigenous cases have not been found in Eritrea. The usual lines of prophylaxis are recommended. Seeing that *Bulinus contortus* is present in Corsica and Sicily, the author warns the authorities to be on their guard against the introduction of the disease into Italy by returning troops.

H. H. S.

SATTA (Ernesto). Identificazione di un focolaio di bilharziosi intestinale nella colonia Eritrea. [**A Focus of Intestinal Schistosomiasis in Eritrea.**]—*Arch. Ital. Sci. Med. Colon.* 1935. Oct. Vol. 16. No. 10. pp. 760-762.

The patient here referred to paid a visit to Deddà Falls (torrente Deddà) down stream from Coazien and bathed in one of the pools. Soon after, he complained of intense itching which continued for 10 minutes, but for nearly 24 hours there was slight irritation of the inner parts of the thighs. Thirty-five days later he had an attack of diarrhoea, with passage of blood and mucus, 20 or more times in the day, with irregular fever and profuse sweating and headache. Ova of *Schistosoma mansoni* were present in the faeces and *Planorbis* was found in large numbers at Deddà from which 20 days after capture living cercariae were derived in the laboratory.

H. H. S.

EGAN (C. H.). **An Outbreak of Schistosomiasis japonicum.**—*Jl. Roy. Nav. Med. Serv.* 1936. Jan. Vol. 22. No. 1. pp. 6-18.

An epidemic of Japonic schistosomiasis got by nearly half a ship's company from bathing in the Yangtse about 100 miles from its source.

So fixed in the lay mind is the idea that schistosomiasis in China is inevitably linked to shooting in paddy fields, that when H.M.S. *Sandpiper* was anchored at Chinkiang in 5 fathoms of water 3 cables from the nearest shore and from the mouth of a creek, and the weather was unusually hot, bathing from the ship was allowed. Though as just stated the ship was 600 yards from the nearest shore the concentration

of cercariae must have been great for 12 of the 18 who bathed became infected. Their case histories are given in detail. "Subsequent investigation showed that the intermediate host is to be found in great abundance in the vicinity and also on the opposite bank." [This little acute epidemic got by bathing recalls the similar one of acute ankylostomiasis got by bathing in the sea at a point where a stream was discharging turbid flood water into it (ASHFORD, PAYNE & PAYNE, this *Bulletin*, 1934, Vol. 31, pp. 122 and 391).] C. L.

MAURITIUS, COLONY OF: ANNUAL REPORT ON THE MEDICAL AND HEALTH DEPARTMENT 1ST JANUARY TO 31ST DECEMBER 1934 [KIRK (J. Balfour), Director]. Appendix I. pp. 42-44.—*Bilharzia* [ADAMS (A. R. D.), Senior Pathologist.]

A further report [see this *Bulletin*, ante, p. 94] on *Bulinus* (*Pyrgophysa*) *forskali* as the mollusc host of *Schistosoma haematobium* in Mauritius.

"*B. (P) forskali* was the only snail of many species tested which exerted a definite attractive action on freshly-hatched miracidia. The miracidia were actually seen vigorously to attack specimens of this species of snail. Penetration was observed *in vivo* under experimental conditions. This was subsequently confirmed by fixation of snails after a short period of exposure to infestation, and section; when it was seen that enormous numbers of miracidia had gained entrance into their bodies. Developmental forms of the larval stages of the worms were readily found on dissection after about two weeks in every snail of this species exposed to infestation; none were recovered from snails of other species. After a period of three weeks characteristic sporocysts were found in the liver glands, containing bifid-tailed cercariae true to type. Within twenty-eight days from initial exposure to infestation every snail so exposed was found on dissection to contain sporocysts with characteristic cercariae in large numbers, and at the end of this period usually a large number of cercariae were being emitted naturally from the affected molluscs. No other type of furcocercous cercaria has so far been found in any snails dissected at the laboratory, in spite of the fact that many hundreds have been dissected during the last ten years; "wild" *forskali* obtained from the canals which we utilise for our material have not so far been found naturally infested, although a specific search on a large scale for naturally-infected snails has not yet been undertaken in places where there is a greater possibility of their acquiring the infection naturally." C. L.

- i. CORT (W. W.). *Studies on Schistosome Dermatitis. I. Present Status of the Subject.*—*Amer. Jl. Hyg.* 1936. Mar. Vol. 23. No. 2. pp. 349-371. [40 refs.]
- ii. TALBOT (S. Benton). *Studies on Schistosome Dermatitis. II. Morphological and Life History Studies on Three Dermatitis-producing Schistosoma Cercariae, C. elvae* Miller, 1923, *C. stagnicolae* n. sp., and *C. physellae* n. sp.—*Ibid.* pp. 372-384. With 3 figs. on 1 plate. [13 refs.]
- iii. CORT (W. W.) & TALBOT (S. Benton). *Studies on Schistosome Dermatitis. III. Observations on the Behavior of the Dermatitis-producing Schistosome Cercariae.*—*Ibid.* pp. 385-396. [16 refs.]
 - i. In essentials a historical survey.
 - ii. Scope seen from title.
 - iii. *Cercaria elvae* acts as does *C. ocellata* of Europe but swims more vigorously. *C. douthitti* escapes from its snail host at night (the other 3 forms do so in the early morning) and spends most of its free life

attached to the surface film. *C. elvae* swims vigorously and rests on that side of the container which is turned to the light with its tail hooked over its body and the furcae crossed. *C. physellae* rests commonly on the bottom with its tail and postacetabular parts almost at right angles to the surface on which it is resting and its furcae spread out. *C. stagnicolae* hangs unattached in the water on the lightest side of the bottle. C. L.

LANCET. 1935. Aug. 24. p. 451.—**Bather's Itch.**

With reference to bather's itch in America (this *Bulletin*, 1928, Vol. 25, p. 946 and 1930, Vol. 27, p. 459), cases of dermatitis were reported from bathers in Burt Lake, Michigan, but no snails were found on the beach; yet when helmets were put on and search made of deep water these were seen to be present at depths of 6 to 18 feet. Since there is no way of putting to death cercariae or molluscs in large bodies of water all that it was possible to do was the marking of their beds so that swimmers were able to keep away from them. C. L.

SAMY (Mostafa). **Bilharzial Piles and Anal Fissure.**—*Jl. Egyptian Med. Assoc.* 1936. Feb. Vol. 19. No. 2. pp. 65–71. With 5 figs.

Unless the cause of these conditions is recognized and the specific drug treatment is set going there will be constant recurrence, and, to him who gives the cases surgical treatment, discredit.

The piles are irregular pale brownish masses of mucosa, harder than ordinary piles, nearly always there have been earlier symptoms of chronic proctitis and the mucus over them has in it schistosome eggs. Within them are enlarged veins perhaps with the eggs in their walls or lumen. They may be a very early sign of the infection and specific treatment at once may save the patient much trouble. The fissures start as bilharzial ulcers at the anal margin, and are clinically fissures with eggs to be seen in scrapings. C. L.

BRUXELLES-MÉDICAL. 1936. Jan. 5. Vol. 16. No. 10. pp. 355–356. With 4 coloured figs. on 2 plates.—Conditions chirurgicales de la bilharziose.

LOVETT-CAMPBELL (A. C.). **Helminthiasis involving the Appendix.**—*West African Med. Jl.* 1935. Nov. Vol. 8. No. 4. p. 15.

Two patients had their appendices taken out for acute symptoms. In the first the only parasites seen in the stools were amoebic cysts and the appendix had schistosome ova, believed to be those of *S. haematobium*, in the submucosa. In the second the faeces showed hookworm eggs and those of *S. haematobium* and tapeworm onchospheres, the appendix only threadworms. C. L.

RODRIGUEZ MOLINA (R.) & PONS (Juan A.). **Hematological Studies on Schistosomiasis mansoni in Puerto Rico.**—*Puerto Rico Jl. Public Health & Trop. Med.* 1936. Mar. Vol. 11. No. 3. pp. 369–400. [48 refs.] [Spanish version pp. 401–433.]

A study of the blood of 20 cases of Mansonian schistosomiasis before treatment.

There were 18 males and 2 females, aged from 8 to 45. One was in the toxæmic stage, the infection got while bathing; he had hookworm eggs in the faeces (though none were seen by Stoll's technique) red corpuscles 5.46 millions, haemoglobin 83 per cent., eosinophils 59.5 per cent. (5,266 of 8,850). In the intestinal stage were 8 persons, with red cells 3.41 to 5.3 million per cmm., haemoglobin from 50 to 116 per cent. and eosinophils from 1 to 56. In the visceral stage were 11 persons, with red cells from 1.36 to 3.96 million, haemoglobin from 30 to 100 and eosinophils from 3 to 30.5 per cent. The other blood details may be seen in the Tables. Fouadin and iron are given as the treatment of choice in the intestinal stage, at which time the anaemia is probably one of long iron deficiency. In the last stage, with worm-caused cirrhosis, liver and iron are of value, but even if the worms are then killed the structural damage has been done. The anaemia now is perhaps caused by deficiency of iron or by the "specific antianaemic factor conditioned by chronic liver damage (cirrhosis) and not necessarily by gastric dysfunction." The spleen was taken out in 2 late cases with great clinical benefit, but the end effect of the operation has still to be seen. C. L.

WATARAI (Jiro). Studies on the Skin Reaction caused by Schistosoma japonicum, cutaneously applied on the Animals.—*Japanese Jl. Experim. Med.* 1936. Feb. 20. Vol. 14. No. 1. pp. 1-18. With 6 figs. on 1 plate. [16 refs.]

"(1) The dermatitis, so-called 'Kabure' with unknown cause seen in the endemic districts of Schistosomiasis japonica is not caused by invasion of Schistosomian cercariae into the skin, but it is probably caused by cutaneous emigration of heterogenous helminth larvae, which are improper to the human being and other mammals.

"(2) The skin reaction caused by Schistosoma cercariae has a certain host-parasite specificity in white rats, but not in domestic fowls." C. L.

CAWSTON (F. Gordon). Recent Research in the Treatment of Bilharzia Disease.—*Jl. Trop. Med. & Hyg.* 1936. Feb. 1. Vol. 39. No. 3. pp. 28-29.

"Bilharzia disease exists to a greater extent among the natives, poor Europeans and the coloured community than among the well-to-do settlers. It is specially pronounced in certain well-defined areas which have been recorded by the medical inspectors of schools, and in these localities *Physopsis africana* Krauss is the usual host.

"Treatment with tartar emetic skilfully applied has been the remedy of choice. Because of its inferior antimony content fouadin cannot be recommended except where intravenous injections are impossible and where treatment can be repeated if found necessary.

"The oxyquinoline derivatives are of great assistance in curing schistosomiasis, in view of their producing far less irritation to the subcutaneous structures and their promise of effecting an early cure of the disease. An extensive investigation is indicated to show how best these newer compounds may be applied to districts where a large proportion of the inhabitants are unable to afford the usual cost of prolonged treatment." C. L.

CAWSTON (F. Gordon). Recent Advances in Schistosomiasis.—*South African Med. Jl.* 1936. Feb. 8. Vol. 10. No. 3. p. 93.

Carbon tetrachloride causes degeneration of schistosome eggs, and in Egypt is often given before fouadin, whose real value is thereby made to seem greater than it is. The sodium tartar emetic is more toxic

than the potassium salt, the lithium salt less so and is deserving of use. Oxyquinoline derivatives of antimony are effective and little toxic.

C. L.

MONTESTRUC (E.) & BERTRAND (Ch.). La bilharziose intestinale à la Martinique et son traitement par l'anthiomaline (antimoniouthiomalate de lithium). [Treatment of Intestinal Schistosomiasis in Martinique by Anthiomaline.]—*Rev. Méd. et Hyg. Trop.* 1936. Jan.-Feb. Vol. 28. No. 1. pp. 31-37.

Anthiomaline has been successful in infection with *S. mansoni* when tartar emetic and foudadin have failed or had to be abandoned on account of syncopal attacks.

Antimoniouthiomalate of lithium was given intramuscularly every other day in successive doses (for adults) of 1, 2, 3 and 4 cc. (each cc. containing 0.06 gm.) to 29 persons; eggs disappeared in 1 case after 1 injection, in 10 cases after 2, in 10 after 3, in 3 after 4, and in 3 cases after 5 injections. In the 27 cases which could be examined later they were not seen again. The tolerance is described as striking. The infection is reported as giving locally so few symptoms that the people have no urge for treatment.

C. L.

WAGER (Vincent A.). The Possibility of eradicating Bilharzia by Extensive Planting of the Tree Balanites.—*South African Med. Jl.* 1936. Jan. 11. Vol. 10. No. 1. pp. 10-11.

Balanites maughamii is deadly to snails and to cercariae.

This work extends that of ARCHIBALD [this *Bulletin*, 1934, Vol. 31, p. 114] on *B. aegyptiaca* and shows that the South African species of tree is as deadly as the Egyptian to *Limnaea natalensis*, *Physopsis africana*, tadpoles, cercariae, and fish of *Barbus* sp. up to 4 in. long, seeing that 1 pint in a litre of water kills in 10 minutes and that "dilutions of 1 in 100,000 cc. killed them in 24 hours."

"It is considered that in those areas where the tree grows naturally, or where it can become acclimatized, the extensive planting of *B. Maughamii* around ponds, vleis and dams and along streams, rivers and canals is a feasible and quite practical method of eradicating bilharzia. That this should be done or that it should become a national scheme cannot, however, in the writer's opinion, be advocated. For, unfortunately, commensurate with the eradication of snails, all fish and frogs would automatically disappear as well. The upsetting of the balance of nature by this wholesale destruction of the natural enemies of mosquitoes, flies, agricultural pests and noxious insects would, without doubt, have disastrous and far-reaching results. However, as snails also carry the cercaria of animal parasites such as liver-fluke, the tree could be planted with advantage around small dams used for watering cattle and sheep or for bathing purposes."

C. L.

CAWSTON (F. Gordon). The Control of Bilharzia Infection in Swaziland.—*Jl. Trop. Med. & Hyg.* 1935. Dec. 16. Vol. 38. No. 24. pp. 305-306.

Advice as to ridding the town of Bremersdorp of infection with *S. haematobium*.

It is pointed out that, in 1928, schistosomiasis of sheep was eradicated at Humansdorp, Cape Province, and that in Bremersdorp, where 1 in 3

of native children becomes infected, the same could be done there for man were the place inhabited by a docile human race. Practical advice is given and it is noted that already the association of infected pools with this disease is being impressed on the children there, and that a course of injections is a popular means of cure. C. L.

UTTLEY (K. H.). **On the Incidence of Clonorchiasis as met with in Post-Mortem Examinations in Kowloon, Hong Kong.**—*Chinese Med. Jl.* 1935. Nov. Vol. 49. No. 11. pp. 1267-1268.

In 367 consecutive autopsies (289 males and 78 females) on adult Chinese, clonorchis was present in 48 males of which 9 were heavy infections, and in 4 females of which 1 was heavy. In no case was the fluke deemed to be the cause of death. C. L.

KOMIYA (Yoshitaka), KAWANA (Hiroshi) & TAO (S. C.). **Study on Clonorchis sinensis in the District of Shanghai. I. Epidemiology of Human Clonorchiasis.**—Reprinted from *Jl. Shanghai Sci. Inst.* 1935. Oct. Sect. IV. Vol. 1. pp. 271-292. [43 refs.]

Faeces of 3,300 Japanese and 716 Chinese living in Shanghai in 1933 and 1934 were examined.

Examination was by a hydrochloric acid, antiformin ether method. The detailed figures are given. Incidence tends to rise with age in both nationalities and with the length of time spent in Shanghai, though among Chinese Cantonese are more heavily infected than others.

C. L.

BOLAÑOS (José M.), KOURÍ (Pedro), ANIDO (Vicente) & BASNUEVO (José G.). El parasitismo intestinal y la clonorchiasis en los chinos retenidos en Tiscornia. [**Intestinal Parasites in Chinese at the Detention Camp, Tiscornia, Cuba.**]—*Rev. Parasit., Clin. y Lab.* Habana. 1936. Jan.-Feb. Vol. 2. No. 1. pp. 39-49. With 3 figs.

In the course of 16 weeks, between July and November, 1935, the faeces of 200 Chinese immigrants were examined at the Detention Camp at Tiscornia, Havana, and 130 or 65 per cent. were found to be harbouring parasites in some form. Protozoa were few; only 4 had protozoa only, 14 had protozoa and helminths, and 112 had the latter only, *i.e.*, 9 per cent. had protozoa and 63 per cent. helminths. Of protozoa, *E. nana* was found in 10, *E. histolytica* and *E. coli* each in 3, and Iodamoeba, Giardia and Chilomastix once each. Helminthic infestations were: Ascaris 94 (47 per cent.), Clonorchis 45 (22.5), Trichuris 23 (11.5), Necator 17 (8.5), *Hymenolepis nana* once only. In 18, Ascaris and Clonorchis were both present; in 7 Ascaris and Trichuris, and Ascaris and Necator, these last three on 4 occasions, Clonorchis and Trichuris 3, these with Ascaris in 2. H. H. S.

KOURÍ (Pedro), BASNUEVO (José G.), ALVARÉ (Leopoldo) & LESCANO (Orlando). Clonorchiasis y cancer. [**Clonorchiasis and Cancer of the Liver.**]—*Rev. Parasit. Clin. y Lab.* Habana. 1936. Mar.-Apr. Vol. 2. No. 2. pp. 141-148. With 37 figs. on 33 plates.

Direct examination of the faeces of Chinese attending the Kow Kong clinic revealed nearly half to be harbouring Clonorchis, and more

recently of Chinese in Tiscornia [see above] 22.5 per cent. were passing the ova. The authors examined the livers of all Chinese coming to autopsy at the Havana mortuary, 17 in number and found 4 with *Clonorchis*. As regards pathological changes accompanying their presence, in one, although the flukes were many, no macroscopic alterations were observed; in another, they were but slight—hypertrophy of the bile ducts. Two, however, showed carcinomatous lesions, and in one there seemed to be a causal connexion between the growth and the infestation, not in the other. The macroscopic and histological changes are described in the text and for the most part well depicted in the many photomicrographs appended to the article, but are not of great interest to the general reader. Those desirous of knowing more should consult the original. Suffice it to say that in the third case, flukes were many, the liver showed much sclerosis of the bile ducts and the interlobular connective tissue with marked cellular infiltration; in the extra-hepatic ducts and in the gall-bladder were signs of inflammation and cirrhosis, and a primary cancer of the bile-ducts had been set up, due, state the authors, to the irritation caused by the presence of the worms and inflammation “due to the germs carried by them,” in a liver already cirrhotic as a result of the infestation. In the other case cancerous changes were beginning, but no connexion was traceable between them and the presence of flukes.

H. H. S.

- i. IDE (Kiyoshi). **On a New Second Intermediate Host of *Clonorchis sinensis*, Wakasagi (*Hypomedus olidus* (Pallas)).**—*Kitasato Arch. Experim. Med.* 1936. Jan. Vol. 13. No. 1. pp. 40–44. With 1 fig. [13 refs.]
- ii. —. **Significance of *Hemibarbus barbus* (Temminck and Schlegel) as the Second Intermediate Host of *Clonorchis sinensis*.**—*Ibid.* pp. 45–47. With 1 fig.

i. This fish, one of the Salmonidae, is added to the list of larval hosts of *C. sinensis* all the others being Cyprinidae. It is a poor host, but being eaten raw is dangerous.

ii. This carp is another larval host and it also is eaten raw. C. L.

YAMAGUTI (Satyû). Ueber die Cercarie von *Clonorchis sinensis* (Cobbold). — *Ztschr. f. Parasitenk.* 1935. Dec. 13. Vol. 8. No. 2. pp. 183–187. With 4 figs.

PLOTNIKOV (N.) & ZERTCHANINOV (L.). [**“Fuadin-Konzentrat” in the Treatment of Opisthorchiasis.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 4. [In Russian pp. 299–301.]

The authors had previously reported the negative results of treatment of human opisthorchiasis with fouadin, which, however, proved to be efficient in feline infections. In the present paper they describe similar results obtained in the treatment of feline and human cases respectively with Bayer’s “Fuadin-Konzentrat.” C. A. Hoare.

DE JESUS (Zacarias). *Lymnaea philippinensis*, an Intermediate Host of *Fasciola hepatica* in the Philippines, with Some Observations on the Bionomics of the Parasite.—*Philippine Jl. Sci.* 1935. Nov. Vol. 58. No. 3. pp. 299–315. With 8 figs. on 1 plate. [32 refs.]

- i. AFRICA (Candido M.), DE LEON (Walfrido) & GARCIA (Eusebio Y.). **Heterophyidiasis : II. Ova in Sclerosed Mitral Valves with Other Chronic Lesions in the Myocardium.**—*Jl. Philippine Islands Med. Assoc.* 1935. Nov. Vol. 15. No. 11. pp. 583-592. With 23 figs. (8 coloured) on 12 plates.
- ii. —, — & —. **Heterophyidiasis : III. Ova associated with a Fatal Hemorrhage in the Right Basal Ganglia of the Brain.**—*Ibid.* 1936. Jan. Vol. 16. No. 1. pp. 22-26. With 4 figs. on 2 plates.

These papers are in fact continuations of that noted in this *Bulletin*, ante, p. 90, in which these flukes and their ova were seen to be the cause of heart failure. As to the new papers their titles give their range.

i. "A systematic study of three infested hearts with sclerosed mitral valves, involving several thousand paraffin sections made from 38 blocks carved from the different regions of the myocardium and valves, is reported in this paper. Different grades of lesion associated with eggs, varying from acute vascular changes in the form of hyperinjection of the blood vessels and marked edema, hemorrhages in the capillaries, and thrombosis secondary to embolism of eggs with fragmentation of the muscle fibers affected, to sclerosis of mitral valves with subsequent calcification leading to thickening and stiffening of the valvular leaflets have been found. Various fibrotic lesions of intermediate grades, such as circumscribed longitudinal or oval masses of closely packed endotheliocytes and histiocytes on a groundwork of young fibrous tissues of various ages, as well as well-formed fibrotic areas, have also been encountered in the different regions of the myocardium. It would seem that the eggs of these flukes are non-toxic or non-irritating, as the tissue reaction does not seem to be directed specifically against them. Reactions are evidently in the form of organization and repair to eliminate the substances spilled in their midst as a result of primary lesions such, for example, as hemorrhages, thrombosis, or embolism, caused by their presence in a mechanical way. It may be surmised, judging from the different ages of the lesions observed, that eggs arrive in the heart in successive sublethal crops in the course of the intestinal infestation by the adult flukes, during which time the valves and the myocardium receive insult after insult and hence become weakened until the heart is finally overwhelmed by a sudden massive terminal flooding of the cardiac vessels with these ova. It would thus seem, even at this stage of the investigation, that the conclusion is inescapable that the heterophyids considered in this work are associated with a definite disease with an apparently distinct and definite pathology, for which the name cardiac heterophyidiasis has been proposed. That this condition is relatively frequent in the Philippines is shown by the facts that new cases continue to come under our observation and that hearts with lesions associated with eggs have been found among old museum specimens. Further studies in the subject are in progress."

ii. "The occurrence of heterophyid eggs in the brain, as mentioned in our introduction, was predicted by us in our first paper (Africa, Garcia, and De Leon, 1935), and their possible presence in the spinal cord should be expected *a priori*, especially considering the fact that eggs of both *Schistosoma hematobium* and *S. mansoni* (which are three to six times larger than the eggs under consideration and, besides, possess cumbersome spines) have already been encountered in this portion of the cerebrospinal system. It must be recalled that the knee jerk was absent in a proportion of the cases of cardiac heterophyidiasis that came under our observation. After seeing the character of the lesions we encountered in the brain of the present case, we wonder if they could not be produced also by the same eggs in the spinal cord, thus accounting for the loss of function of this organ.

"Whether or not these eggs and the lesions we attribute to them in the brain of the present case are in any way related etiologically to the fatal

hemorrhage in the right basal ganglia cannot be decided on the basis of our present finding. The fact is certain, however, that heterophyid ova can be filtered in the brain from the general circulation and cause lesions in this organ that are exactly identical to those we found in the myocardium in our cases of cardiac heterophyidiasis. There is ample evidence that the mechanism of the production of these lesions in the brain is quite analogous to that which takes place in the heart; namely, plugging of capillaries and other vessels with eggs, rupture of these vessels, and the attempt at organization of spilled material in which proliferated endotheliocytes and histiocytes in a groundwork of fibrous tissue take a prominent part. These tissue reactions, which we observed associated with eggs in the wall of the large brain clot (which presumably killed the patient), are indications that capillary hemorrhages, obviously caused by the plugging of these vessels with eggs, had occurred some time prior to the fatal issue. Again, by looking at the character of these lesions, their presence in the brain substance in the immediate vicinity of an important or vital vessel (as seems to have occurred in this particular case) may tempt one to speculate on the possibility that this condition might cause increased peripheral resistance in a state of hypertension (as was true in this case) and bring about or precipitate the fatal hemorrhage. Furthermore, such lesions, which may lead sooner or later to degeneration and sclerosis, may possibly account for some cerebral conditions of unknown etiology—such, for example, as epilepsy, hemiplegia, aphasia, paresis, blindness, insanity, etc., depending on the extent and location of the lesion. At least, in further studies on heterophyid infestation of the cerebrospinal system these possibilities should not be overlooked.”

C. L.

IZUMI (Matsunosuke). Studies concerning a New Species of Metagonimus and its Life Cycle.—*Kitasato Arch. Experim. Med.* 1935. Oct. Vol. 12. No. 4. pp. 362–384. With 5 figs. on 1 plate. [35 refs.]

The new species is named *Metagonimus katuradai*; details are given of its structure and life history.

It is about 2/3 of the size of *M. yokogawai*. The points in which it is thought to be different from other allied species are given. The host species harbouring the metacercaria are 3 freshwater fish named as “*Acheilognathus lanceolata intermedia*”, *Pseudorasbora parva*, and *Zacco platypus*. Infections have been caused in white rat, mouse, rabbit, dog, cat and man, and eggs were present in the faeces on the sixth day in man.

C. L.

To (Sômei) & Ko (Bun). Erfahrungen in der Behandlung der Lungen-Distomiasis mit Carpain. [**Carpain in the Treatment of Paragonimiasis.**]—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1935. Dec. Vol. 34. No. 12 (369). [In Japanese pp. 2070–2076. [12 refs.] German summary p. 2077.]

Subcutaneous injections with 5 per cent. carpain hydrochloride in normal saline cured two fresh cases of Paragonimiasis and improved two others who had already been treated with emetine hydrochloride. The total quantities of carpain injected were respectively 0.3 gm. over 6 days, 1.1 gm. over 23 days, 0.5 gm. over 10 days, and 0.9 gm. over 30 days.

C. L.

UJIE (N.). **On Structure and Development of *Echinochasmus japonicus* and its Parasitism in Man.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1936. Feb. Vol. 35. No. 2 (371). [In Japanese pp. 535–545. With 1 plate. [43 refs.] English summary pp. 545–546.]

Deliberate infection with *Echinochasmus japonicus* has been effected in two men.

First seen by TANABE in 1926 a new description in Japanese is given here of this fluke, with good figures. Its second intermediate host is *Pseudorasbora parva*—in the form of cysts on the gills. Its ordinary definitive host is dog or cat but mouse and rat and other mammals become so experimentally, and Ujiie infected himself and another volunteer. Eggs are seen in the faeces in man on the 7th or 8th day, the egg is oval, light yellow, operculum present but with no thickened rim, a protuberance at the other pole, and its mean size is 0.085 by 0.056 mm. The worms live in the lower half of the small intestine, causing some catarrh and are easily got rid of by carbon tetrachloride or ascaridole. C. L.

HOFF (Ferdinand) & SAUERSTEIN (Hans). Ueber Bothriocephalus-Anämie. [**Diphyllobothrium Anaemia.**]—*Klin. Woch.* 1936. Jan. 25. Vol. 15. No. 4. pp. 131–135. With 1 fig.

Bothriocephalus anaemia has an essential hereditary factor.

Of 270 cases of infection with *Diphyllobothrium latum*, 60 had an anaemia of the pernicious type and 26 a hypochromic condition such as is seen in secondary anaemia. It is not agreed that the pernicious type is somewhat rare by reason of the fact that the inhabitants unwittingly treat themselves by eating fish liver. This is a family disease and it is held that there is some hereditary constitutional peculiarity which brings it about. Those who harbour the worm without anaemia have nearly all normally acid gastric juice, and the fact that the two sorts of anaemia occur in members of the same family, and the observed passage of the pernicious into the chlorotic type during cure, is against any essential difference between the two forms. C. L.

OTTO (G. F.). **Human Infestation with the Dwarf Tapeworm, *Hymenolepis nana*, in Southern United States.** [Abstract.]—*Jl. Parasitology*. 1935. Dec. Vol. 21. No. 6. pp. 443–444.

“ Human infestation with the dwarf tapeworm ranged from 0–9.3 per cent. in South Eastern United States. Outside the mountain areas the incidence averaged a fraction of a per cent. In the rural mountain population it was between 3 and 4 per cent. In the mining camps in the Kentucky Mountains it was between 9 and 10 per cent. The greatest infestation was in the 5–14 year age group (3.5 to 4.5 per cent. in the rural mountain population). In all other age groups in the same area the incidence was less than two per cent. In adults (over 20 years) and children less than 2 years the incidence is only a fraction of a per cent. Since the highest infestation is in the same area and age group with the highest ascaris infestation it suggests a similarity in acquisition of these infestations. The protozoa incidence is also exceptionally high in this area and the high incidence first appears in the same age group with the high ascaris and dwarf tapeworm infestation. It seems unnecessary then to invoke the rat as a disseminator of

the infection. The fact that the incidence with the dwarf tapeworm is so much lower than that of the other infestations mentioned may be attributed to the fact that the tapeworm eggs are less resistant to environmental conditions. Human infestation is probably for the most part acquired from contamination with fresh feces of human carriers."

OTTO (G. F.). **Human Infestation with the Dwarf Tapeworm (*Hymenolepis nana*) in the Southern United States.**—*Amer. Jl. Hyg.* 1936. Jan. Vol. 23. No. 1. pp. 25-32. [24 refs.]

"The dwarf tapeworm in the United States occurs most commonly in school age children of the mountain districts of the southeastern part of the country, occurring up to 9-10 per cent. In all other areas and in other age groups the incidence is much lower, often being but a fraction of a per cent. Negroes have a somewhat lower incidence than whites. Human infection is probably acquired from an autochthonous strain by the ingestion of eggs from comparatively fresh feces."

Although it was the case that in decinormal NaOH solution partially dissolved eggs were seen, "it seems unlikely that the destruction of all of the eggs in a specimen occurred very often." This is the assumption which underlies the figures given, which were all obtained by the use of this diluting solution. C. L.

HUNNINEN (Arne V.). **An Experimental Study of Internal Autoinfection with *Hymenolepis fraterna* in White Mice.**—*Jl. Parasitology.* 1936. Feb. Vol. 22. No. 1. pp. 84-87. With 1 fig.

Mice were put into stocks of such a kind that they could not possibly eat their faeces, with these results.

"From the above experiments the suggestion can be made that internal autoinfection with *H. fraterna* does not occur in normal mice but may occur in mice whose resistance has been decreased by some factor as for example, by bacterial infection. Further, this experimental demonstration of the possibility of the occurrence of internal autoinfection under certain conditions in mice, make it seem very probable that it may occur under similar conditions with *H. nana* in man. C. L.

COUTELEN (F.). Les oiseaux domestiques peuvent-ils héberger spontanément des hydatides échinococciques et prendre place dans le cycle évolutif normal du ténia échinocoque? (Contrôle expérimental). [**Can Domestic Birds harbour Hydatids and take part in the Normal Developmental Cycle of *T. echinococcus*?**—*C. R. Soc. Biol.* 1936. Vol. 121. No. 6. pp. 490-493.

The answer to the question in the title is No.

Two fowls, 5 pigeons and 3 young turkeys were given about 400,000 scolices each into the peritoneal cavity, and showed no infection 25 days to 7½ months later. C. L.

CARRODUS (Arthur L.). **Intrabiliary Rupture of Hydatid Cysts of the Liver : Report of Five Cases.**—*Med. Jl. Australia.* 1935. Nov. 23. 22nd Year. Vol. 2. No. 21. pp. 714-724. With 6 figs.

The account and discussion of these five cases is detailed and of marked surgical interest.

Important points for tropical medicine are the need for washing the stools in cases where there is doubt, an action which may bring to light a bile-stained gelatinous membrane in the pan ; a positive intradermal Casoni reaction in 90 per cent. of persons, the other ten per cent. having nearly all a positive complement deviation reaction ; while X-rays may show the outline of cysts.

C. L.

BLANCO (R. Piaggio), CAPURRO (F. Garcia) & DÉVÉ (F.). Un cas humain d'échinococcose hépatique micropolykystique infiltrée, observé en Uruguay. [**A Case of Hydatid of Liver observed in Uruguay.**]*—Bull. Acad. Méd.* 1935. Dec. 3. 99th Year. 3rd Ser. Vol. 114. No. 39. pp. 520–523. With 1 fig.

The first case of alveolar hydatid reported from Uruguay. In spite of hepatic puncture during life its discovery was only made after death.

C. L.

CATALIOTTI (F.). L'echinococco della tiroide. [**Hydatid of the Thyroid.**]*—Riv. Sanitaria Siciliana.* 1935. July 15. Vol. 23. No. 14. pp. 1064–1068, 1071–1072. With 1 fig. [12 refs.] French summary (5 lines).

Search of the literature has shown that hydatid cyst of the thyroid is a rare event, about 0.5 per cent. of such tumours having this situation and the condition is usually discovered at operation or autopsy. The present account is that of a woman of 28 years who stated that her neck had been getting larger for two years ; she first noticed a local swelling the size of a hazel-nut, but it was now that of a large orange. It was cystic and appeared to be divided into two by a sulcus. Operation was undertaken in the belief that the tumour was a cystic goitre, but except for firm adhesions at the base was found to be easily separated and proved to be a hydatid.

H. H. S.

TURNER (E. L.), BERBERIAN (D. A.) & DENNIS (E. W.). The Production of Artificial Immunity in Dogs against *Echinococcus granulosus*.*—Jl. Parasitology.* 1936. Feb. Vol. 22. No. 1. pp. 14–28. [23 refs.]

PENFOLD (W. J.), PENFOLD (H. Boyd) & PHILLIPS (Mary). **A Survey of the Incidence of *Taenia saginata* Infestation in the Population of the State of Victoria from January, 1934, to July, 1935.***—Med. Jl. Australia.* 1936. Feb. 29. 23rd Year. Vol. 1. No. 9. pp. 283–285.

Infection with *Taenia saginata* is relatively rare in Victoria, being seen mostly in Syrians infected before coming to Australia. A stronger quarantine policy and proper payment of those whose help is asked are advised.

C. L.

CH'ENG (Y. L.) & K'ANG (H. J.). *Cysticercosis cellulosa* in Man. (Report of a Case with Very Severe Infestation, especially of the Brain.)*—Chinese Med. Jl.* 1936. Feb. Vol. 50. No. 2. pp. 137–139. With 4 figs. on 2 plates.

A very heavy general infection with cysticerci.

The history was mainly of mental trouble. It began 4 years earlier with headache and loss of vision but no vomiting. Then the patient

began to see ghosts. There were attacks of unconsciousness before which there was marked increase in the headache. She came to hospital for opium poisoning and died in 10 hours. Figures illustrate the weight of the infection in brain and muscles. C. L.

LIPSCOMB (F. M.). **A Case of Cysticercosis (*T. solium*).**—*Jl. Roy. Army Med. Corps.* 1935. Dec. Vol. 65. No. 6. pp. 397-400. With 1 chart.

A case of cerebral cysticercosis which was probably under observation from infection to death and so is worthy of detailed note.

A private of 21, evidently in the Rawalpindi District, Punjab, India, was taken into hospital with fever and body pains suggesting enteric. Eosinophils on days 6, 7, 11 and 18 of the infection were 3, 7, 12 and 1 per cent.; there was severe occipital headache about day 10, soon disappearing; on day 11 a tapeworm segment passed, but the picture was so like enteric that no anthelmintic was given. Temperature from day 26 to day 34 was normal and tests for enteric and melitensis infections negative. A tapeworm onchosphere was seen on day 20. On day 35 filix mas brought away a complete *Taenia solium*. About day 70 he was discharged, about day 83 taken in again with weakness, headache and vomiting, about day 105 papilloedema with loss of sight in right eye, on day 113 this was worse with severe headache and vomiting, on day 123 a right subtemporal decompression improved things for the time, but hernia cerebri came on with fever and unconsciousness and he died on day 161. The hernia cerebri had caused abscess with local meningitis. There were 150 cysticerci scattered through the brain, none was found elsewhere. C. L.

MACARTHUR (W. P.). **Cysticercosis of the Brain.** [Correspondence.]—*Brit. Med. Jl.* 1935. Dec. 21. p. 1229.

BRITISH MEDICAL JOURNAL. 1935. Dec. 21. pp. 1214-1215.—**Cysticercosis and Epilepsy.**

Cysticercosis of the brain need be no matter of ready diagnosis.

Quiescence is essential for the parasite's survival, but when it dies it causes symptoms by swelling and by the freeing of toxins, or it may be detected by X-rays through the calcification which then comes about, though in the latter case this change cannot be expected till symptoms have lasted for about 3 years. C. L.

DICK (John C.). Cerebral Cysticercosis simulating Epilepsy. [Memoranda.]—*Brit. Med. Jl.* 1936. Feb. 22. p. 364.

GÖGL (H.). Zystizerkose des Gehirns. [**Cerebral Cysticercosis.**]—*Wien Klin. Woch.* 1935. Nov. 15. Vol. 48. No. 46. pp. 1417-1419. With 1 fig. [17 refs.]

Two cases with brain symptoms are described in which the exciting cause is put down as *Cysticercus racemosus*, described by ZEDER in 1871, parasites which have no heads. Both of these were found about the optic chiasma. There were no cysticerci in other organs and no tapeworms in the intestine. C. L.

MORRISON (W. K.). **Pig and Pork : Cysticercosis (*Taenia solium*).**—*Jl. Roy. Army Med. Corps.* 1936. Jan. Vol. 66. No. 1. pp. 32–35.

“(1) Infestation of pig in South India with cysticercosis (*T. solium*) is not uncommon.

“(2) Such an infestation may be from one or two parasites up to any number.

“(3) Practical inspection of pig flesh should be followed up by thorough cooking.”
C. L.

TRAWIŃSKI (A.). Ueber Anwendung der Präzipitationsreaktion zum Nachweis der Schweinezystizerkose. [**The Precipitin Reaction in the Diagnosis of Cysticercosis in Pigs.**]—*Zent. f. Bakt.* I. Abt. Orig. 1936. Feb. 13. Vol. 136. No. 1/2. pp. 116–120.

A positive precipitin reaction for cysticercosis in pigs was given with an antigen made from *Cysticercus cellulosae*. The reaction is specific and is got with blood serum and muscle extract.
C. L.

LARROUSSE (F.). Évolution du *Cysticercus fasciolaris* et injection d'extraits vermineux : réaction de type sarcomateux. [**Sarcoma-like Reaction to Injection of Worm Extracts.**]—*Ann. Parasit. Humaine et Comparée.* 1935. Nov. 1. Vol. 13. No. 6. pp. 528–532. With 2 figs. on 1 plate.

In 3 rats harbouring *C. fasciolaris* intraperitoneal injection of worm extracts has brought about a sarcomatous reaction, extract of *T. saginata* being used in 2 cases and of *F. hepatica* in one.
C. L.

MAPLESTONE (P. A.) & RIDDLE (J. S.). **Infection with *Bertiella studeri*.**—*Indian Med. Gaz.* 1936. Feb. Vol. 71. No. 2. p. 81.

A European boy of 5 in Fyzabad passed segments of a *Bertiella*, probably *B. studeri*, after being given magnesium sulphate for vomiting and colic. The two other Indian cases lived in Eastern Bengal. This is the tenth case from man, for ADAMS and WEBB [this *Bulletin*, 1934, Vol. 31, p. 119] counted one twice; it had been reported by MUKERJI [this *Bulletin*, 1928, Vol. 25, p. 448] and merely recorded by CHANDLER.

C. L.

REVIEWS AND NOTICES.

ORENSTEIN (A. J.) [C.M.G., LL.D., M.D., etc., Chief Medical Officer] & GORDON (A.) [F.I.S.E., Chief Health Inspector]. **Notes on Elementary Hygiene, etc., for Compound Officials.**—68 pp. With 11 folding figs. 1936. Johannesburg: Central Mining—Rand Mines Group. Health Department. P.O. Box 1056. [Review appears also in *Bulletin of Hygiene.*]

The first issue of this book was made more than 5 years ago, and during the interval not only was the edition exhausted but also a reprint. The opportunity of a re-issue has been taken to review and revise the information. These notes were originally compiled to constitute a guide for compound officials in whose hands rests largely the prime responsibility of maintaining the health of the employed natives and to that end of seeing that no readily preventable violation of the canons of hygiene occurs. For this enlarged and revised edition the Chief Medical Officer, Dr. A. J. Orenstein, has co-opted the services of the Chief Health Inspector, Mr. A. Gordon. The mine officials are taking an ever-increasing interest in the sanitary state of the mines and the welfare of the native employees, stimulated doubtless by the efforts of the Chief Medical Officer, and the results of this interest have found expression in the lowered morbidity and mortality rates of late years.

The work follows the usual lines—general principles applied to local conditions. It is divided into eleven chapters. The first two briefly describing the body and its needs and the ways in which health may be maintained and disease result from their neglect. Then in succession are chapters on Housing, Waste-disposal, Disinfection (and these are supplemented by an appendix of illustrations of plans of houses, ablation rooms, latrines, refuse bins, destructors, disinfectors, etc.). Food (including ration scales, the constitution of the various foodstuffs and their vitamin content), kitchen methods and the need for cleanliness therein. Short chapters deal with rat proofing of buildings, the catching and poisoning of rats, the points to note when making inspection of a compound, or when choosing a site for a new compound. The terminal chapter gives a few hints to the layman on the early signs of disease among natives under his charge, so that the patient may receive treatment soon, and danger of spread of infection among his fellow-workers be minimized. Such a work should find a ready acceptance by a wider circle than that of mine officials; many of the points would apply equally in any African colony where natives are employed.

H. H. S.

CHANDLER (Asa C.) [M.S., Ph.D., Professor of Biology, Rice Inst., Houston, Texas, etc.] **Introduction to Human Parasitology.** Fifth Edition. Rewritten and Enlarged.—pp. xvi+661. With 308 figs. 1936. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Limited. [25s.]

It is now eighteen years since Professor Chandler first published his book on Animal Parasites and Human Disease [see this *Bulletin*, 1918, Vol. 12, p. 228] which was designed to set forth the important facts of human parasitology in a form sufficiently readable to appeal to a wider public than professional biologists and physicians. This wider object

failed, but instead the book has been extensively used as a textbook for introductory courses in parasitology both in academic and medical schools, therefore the work has been entirely rewritten and rearranged from this point of view. The result is a well balanced text-book on the subject, which, in the short space of little more than 600 pages, manages to include the main features in the life-cycles, epidemiological factors, and inter-relations of parasite and host in the case of the more important animal parasites affecting man, together with an account of the main principles of treatment and prevention.

The book is divided into three sections of approximately equal size dealing respectively with protozoa, helminths and arthropods. For convenience, spirochaetes, rickettsiae, and the filterable viruses transmitted by insect vectors are also included in the section on protozoa. The second part, dealing with helminths, is of especial interest as it includes, perhaps, some of the most important recent advances in our knowledge of human parasitology.

The third section opens with an eloquent peroration on the importance of arthropods as disease carriers, for relatively few are directly injurious, but the statement that "trench fever" "was the cause of more morbidity among the allied soldiers during the Great War than all other factors combined" is surely an exaggeration. Again this section gives an excellent introduction to the subject, but some of the figures, especially those drawn from photographs, are not in keeping with the general high standard of the book.

It is difficult in a work of this magnitude to avoid the inclusion of some slight slips such as *Morisund* for *Moursund* on p. 52; *Citillus* for *Citellus* on pp. 13, 199 and 507; but it would be ungracious to dwell on any of these minor flaws in an excellent piece of work, which can be thoroughly recommended to all students of the subject.

The author pays a grateful tribute to the assistance derived from the *Tropical Diseases Bulletin* and also from the *Review of Applied Entomology* and the *Journal of the American Medical Association* and remarks that the preparation of the book could not possibly have been completed without the help of these journals. E. Hindle.

MACIEL (Heraldo) [Membro titular da Academia Nacional de Medicina, Docente livre de Medicina, Docente livre de Medicina Tropical e Doenças Infecciosas]. **Helminthos e helmintoses do homem, no Brasil.** [Helminths and Helminthiasis of Man in Brazil.]—404 pp. With 17 coloured graphs & 89 figs. (2 coloured). 1936. Rio de Janeiro: Imprensa Naval.

Though this book is largely of the nature of a compilation, the work has been carefully and conscientiously carried out and so becomes a mine of reliable information. It is divided into six main sections, apart from a brief introduction. The first, condensed into 4 pages, gives notes on the technique for a study of worms—their fixation, preservation and staining. The second, 120 pages, describes *seriatim* the various worms—nematodes, trematodes, cestodes and acanthocephala—which infect man in Brazil, giving in each case the synonyms with dates, their characters, habitat, evolution and developmental cycle, illustrated by line drawings mostly borrowed. Then follows another short section of 14 pages on laboratory methods used in diagnosis—search for ova, larvae, and adults in the faeces, urine, sputum and blood. Mention is made of *Sch. haematobium* and of *Paragonimus* though neither of these

occurs in Brazil. Stoll's, Clayton Lane's and Prager Froes' methods of examination for ova are all described. The fourth section, 4 pages only, treats of serodiagnostic methods, complement deviation, flocculation (precipitin) and intradermal reactions. Fairley's technique for *Schistosoma* is spoken of under the first of these, but his name is not referred to under the last. The fifth and longest section, 140 pages, takes up the clinical aspect of Brazilian helminthiasis, each being dealt with under the headings of synonymy, aetiology, geographical distribution, the endemic index in Brazil, the symptomatology, pathogeny when important, diagnosis, prognosis and treatment, both curative and prophylactic. This part is well illustrated. The final section relates in more or less general terms, without much detail, the results of a ten years' anthelmintic campaign from 1920-29, as gauged by patients in the Marinha Central Hospital. Figures of incidence and of infestation by separate species of worm are presented in tables and there is a series of 17 graphs depicting the incidence by single species and by combinations of species. A bibliography of 22 pages is appended, but of Brazilian literature only, so that, though it shows what has been done in that country or by Brazilian authors, it is far from complete. There is a useful index. H. H. S.

MOLLARET (Pierre). **Le traitement de la fièvre jaune.** [Treatment of Yellow Fever.]—128 pp. (Collection Les Thérapeutiques Nouvelles.) 1936. Paris: J. B. Baillière et Fils. 19 rue Haute-feuille. [18fr.]

This small book forms one of a numerous series now being published in France under the title of "Les thérapeutiques nouvelles," designed to give in precise form the most recent advances in treatment. Unfortunately in yellow fever as in other virus diseases specific chemotherapeutic treatment is lacking and all that can be done is to attempt to alleviate the various dangerous symptoms that may arise. With this end in view the book begins with a brief outline of the main clinical features of the disease. General and symptomatic treatment is then fully discussed with special insistence on the value of sugar and of large quantities of fluid, which should be administered *per rectum* if gastric intolerance is so great as to prevent their being retained when given by mouth. An interesting account is given of the preparation of certain native remedies, derived from indigenous African plants, such as *Andropogon Schoenanthus* L. which certainly has a diaphoretic action and when boiled gives off an aromatic odour that drives off mosquitoes. The value of immune serum in treatment is also fully discussed.

The second part of the book deals with the prophylaxis of yellow fever—the measures to be taken to prevent mosquitoes biting persons attacked by the disease, aerial and maritime quarantine: an excellent account is also given of the present position of affairs in regard to immunization. There are one or two small errors: on page 99 Low becomes transformed into Carmichael. It is perhaps unduly pessimistic to state that "la nature du virus amaril demeure encore complètement inconnue" for it can now be easily grown in tissue culture, its size is accurately known and its general properties conform to those of other viruses. There is no index but a full "table des matières" completes a very useful and instructive volume. G. M. Findlay.

HOPKINS (G. H. E.) [M.A., F.R.E.S., Entomologist, Department of Agriculture, Uganda.] **Mosquitoes of the Ethiopian Region. I.—Larval Bionomics of Mosquitoes and Taxonomy of Culicine Larvae.**—250 pp. With 158 figs. 1936. London: British Museum (Natural History).

We understand that the work will be completed in three volumes, of which the second (on Anopheline adults and early stages by Dr. A. M. Evans) and the third (on zoogeography and taxonomy of adult Culicines by Dr. F. W. Edwards) will appear in 1937. It is hoped to review the three volumes together at a later date. It must suffice for the moment to deal very briefly with Hopkins' contribution, which describes the ecology of mosquito larvae in Africa, and more particularly the larvae of the Culicines. A remarkable proportion of these have been described and figured. The present volume will prove of great value to those who require to identify Culicine larvae in relation to studies on yellow fever.

P. A. Buxton.

SOCIEDAD ARGENTINA PATOLOGIA REGIONAL DEL NORTE. **Octava Reunión . . . celebrada en Santiago del Estero 2 y 3 de octubre de 1933.** [Proceedings of the Eighth Conference of the Pathological Society of Northern Argentine.] Primera Mitad. pp. 1-466. With numerous illustrations. Segunda Mitad. pp. 467-1064. With numerous illustrations. 1936. Buenos Aires. Imprenta de la Universidad.

These proceedings, collected in two volumes and together comprising over a thousand pages, are profitable for reference and are a welcome addition to libraries whose readers are interested in diseases of the tropics. For those who wish to keep up to date, however, these volumes are issued too late. The second volume, containing 85 of the 105 papers recorded, has only just reached us (May 1936), although they were read at the Conference in October 1933. The first volume, except for an article on Argentine scorpions, was concerned entirely with mycology. The second is by far the more important; it contains 5 articles on medical and applied entomology, 82 on pathology and experimental medicine, 7 on leishmaniasis and dermatology and the rest on human and comparative parasitology. Fortunately, some of the papers have already appeared elsewhere and have been abstracted in this *Bulletin*, so that by the time the full report of the Proceedings is available much of the contents are already well known.

H. H. S.

DODGE (Carroll William) [Ph.D., Mycologist, Missouri Botanical Garden, etc.]. **Medical Mycology. Fungous Diseases of Men and Other Mammals.**—900 pp. With 142 figs. 1936. London: Henry Kimpton, 263 High Holborn, W.C.1 & St. Louis: The C. V. Mosby Co., 3523-25 Pine Boulevard. [42s. ; \$10.00.]

In his preface the author states that he presents a complete survey of the literature in this field to the end of 1933, and gives "for the first time . . . a relatively complete and accurate bibliography of existing literature." If "pathogenic fungi" be substituted for "fungous diseases" in the title, this becomes a fairly accurate statement of the scope of the book, for the mycological aspect completely overshadows the medical.

The first chapter is a brief account of systematic mycology, on the lines developed in the well-known work of GÄUMANN and DODGE. Like the latter it is somewhat overburdened with the special terminology beloved of the systematist. Then follow four short chapters on Physiology of Fungi, Culture Media, Isolation of Microorganisms, and Microscopy, containing a useful account of the special technique of the medical mycologist. It is difficult to see the purpose of Chapter VI, which is almost entirely a reprint of the International Rules of Botanical Nomenclature, unless it is to justify the author's polemical outbursts.

The rest of the book deals with the several classes of fungi *seriatim*. The classification of many of the important groups of pathogens will not receive universal acceptance and is certainly open to criticism. From the great class of Fungi Imperfecti have been removed all the genera believed to be closely related to perfect fungi, *i.e.*, Ascomycetes. Thus *Monilia* and related genera form a family termed *Eremascaceae Imperfectae*, the dermatophytes become *Gymnoascaceae Imperfectae*, and *Aspergillus*, *Penicillium* and related genera are all put in the *Aspergillaceae*, leaving a comparatively small number of genera in the Fungi Imperfecti proper. Keys are given to the pathogenic species of all genera described, followed by cultural and microscopical data for each fungus, with usually a brief, often very brief, clinical account. The illustrations are all of the type found in books on pure mycology and a great many are of value only to the worker who is primarily concerned with generic relationships.

The bibliography is a noteworthy feature and occupies a large portion of the book, the references for the Endomycetales alone occupying 50 pages, but, in view of the completeness and accuracy of the medical references, it is difficult to understand the frequent omission of references for purely taxonomic works cited in the text.

The book will prove to be a valuable book of reference for the mycologist who specializes in the study of the pathogenic fungi. It will have less appeal for the medical man who specializes in mycoses, whilst for the field worker it is altogether too cumbersome and diffuse.

G. Smith.

SNOWMAN (J.) [M.D., M.R.C.P.Lond.]. **Manual of Emergencies. Medical, Surgical and Obstetric. Their Pathology, Diagnosis and Treatment.** Third Edition.—pp. ix + 401. 1936. London: John Bale, Sons & Danielsson, Ltd., 83-91 Great Titchfield Street, Oxford Street, W.1. [10s.]

Exactly ten years have elapsed since the second edition of the *Manual* was reviewed in this *Bulletin*, 1926, Vol. 23, p. 329. Since then many sections have been rewritten, new sections have been added and more recent views on pathology, diagnosis and treatment have been embodied to produce a volume containing a great deal of valuable information. At first sight it might appear to be a pocket manual but its well printed pages contain roughly no less than half the number of words as TIDY'S *Synopsis of Medicine*! The criticisms offered in the review of the second edition are true of the present edition. As was then remarked "what is gained by giving some account of the operation for exposure and repair of a wound of the heart while omitting a description of how to perform paracentesis of the tympanum?" Many of the subjects treated can hardly be called emergencies. Thus for example though sudden loss of consciousness may occur in general paralysis for which

as the author states "there is of course no direct treatment," in a paragraph immediately below some account, not very well done, is given of malarial therapy in that disease. It seems a pity that what is really a valuable book should not have been more carefully planned. Nothing is said concerning the treatment of renal and biliary colic, nor how to give relief to an acute lumbago—presumably these are not emergencies—yet we are told that "in discussing the pathology of these diseases [nephritis] modern writers have adopted the term nephron to describe the glomerulus with its associated vessels and renal tubule." Some idea of the scope of the book will be gained by looking at the "Contents."

Dangerous emergencies in disease of the respiratory system—haemorrhage, obstruction, etc. Heart—syncope, auricular fibrillation, angina, coronary thrombosis, etc. Nervous system—cerebral haemorrhage and thrombosis, meningitis, encephalitis, coma, concussion, fracture of the skull, etc. Convulsions. Gastro-intestinal-tract—haemorrhage, obstruction, acute peritonitis, etc. Urinary organs—haemorrhage, retention, suppression. Poisons. Emergencies in midwifery.

H. S. Stannus.

OGILVIE (W. H.) [M.D., M.Ch., F.R.C.S.]. **Treatment of Fractures in General Practice.** 2nd Edition. Vol. 1. pp. viii+1-108. With 27 figs. Vol. 2. pp. vi+109-180. With figs. 28-37. Pocket Monographs on Practical Medicine. F'cap. 8vo. 1936. London: John Bale, Sons & Danielsson, Ltd., 83-91, Great Titchfield Street, W.1. [2s. 6d. each volume.]

The issue of this most useful set of publications continues and the popularity of the work on Fractures is evidenced by the necessity for another edition. The subject of fractures and their treatment is one which comes within the purview of every man in general practice, and among those working in tropical countries with growing and developing industries accidents may constitute a no inconsiderable part of their duties and the prompt and correct treatment of fractures is all important. There is no need to speak in detail of the advantages of these Pocket-Monographs; suffice it to say we are here presented in the handiest possible form with the method of choice of treating practically any form of fracture which the practitioner is likely to encounter. In the first volume the author devotes half of the 108 pages to general principles, and the rest to fractures of the upper limb and shoulder girdle; in the second he deals with the lower limb and pelvis, and the thorax and spine, all in 72 pages—a model of succinct writing. The only omissions are fractures of the head—skull and face-bones—and the jaws. It is a little surprising that fractures of the nasal bones and mandible are not dealt with, for early correct treatment of the last is an essential to obtaining good results.

H. H. S.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

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[No. 8.

HELMINTHIASIS.

KELLER (A. E.) & LEATHERS (W. S.). **The Incidence and Distribution of *Ascaris lumbricoides*, *Trichuris trichiura*, *Hymenolepis nana* and *Hymenolepis diminuta* in Thirty-Six Counties in Kentucky.**—*Amer. Jl. Hyg.* 1936. Mar. Vol. 23. No. 2. pp. 216-230. With 2 maps & 1 fig. [13 refs.]

Examination was of 0.005 gm. of faeces in decinormal caustic soda solution from 23,964 specimens. *Ascaris* incidence in the mean was 34.7 per cent. (16.6 to 40.8). Of positive cases 23.2 per cent. contained unfertile eggs only, 24.75 fertile eggs only, and 51.98 both. This infection was often familial. [Since their real infection rates will not be got by this method for trichuris and probably not for the two tapeworms, the figures need not be given.] Clayton Lane.

RAFAEL RÍSQUEZ (Jesús). Parasitismo por *Ascaris lumbricoides* verificado en Caracas (en 25,000 análisis). [**Prevalence of *A. lumbricoides* in Caracas.**]—*Gac. Méd. de Caracas.* 1935. Nov. 30. Vol. 42. No. 22. p. 347.

During the period 1932-35 the author has made at the Ministry of Health laboratory 25,000 examinations for *Ascaris*. Of the total, half were children, 20 per cent. men and 30 per cent. women. In 1933 and 1934 the percentage found infested was 46.0 and 44.8 respectively and in part of 1935, 45.3 per cent. [Unfortunately, the method of examination is not stated.] H. H. S.

ALICATA (Joseph E.). **Early Developmental Stages of Nematodes occurring in Swine.**—*U.S. Dept. of Agric. Washington. Technical Bull. No. 489.* 1935. Dec. 96 pp. With 30 figs. [143 refs.]

In this publication facts reported on the eggs of *Ascaris lumbricoides* from the pig are important for human medicine.

It was noted by RANSOM & FORSTER in 1920 that the embryo undergoes a moult while within the egg. Alicata's suggestion is that till that moult has taken place the larva does not become infective. In his experiments with guineapigs there were no lesions and no larvae in the lungs so long as the first moult had not taken place, that is up to 15 days' culturing at 33°C. At 16 days 10 per cent. of embryos were in the first moult and there were in the lungs 5 ascaris larvae

and several petechial haemorrhages; at 17 days 50 per cent. of embryos were in the first moult, 16 larvae were seen in the lungs, which were moderately congested; at 18 days 90 per cent. of embryos were in the first moult, 28 larvae were seen in the lungs, which had heavy congestion. About 4,000 eggs were fed to the guineapigs at a time. [The importance of the paper is that in the evidence for modes of transmission collected in this *Bulletin*, 1934, Vol. 31, p. 605, the eggs have, the reviewer thinks, always been described in the original papers merely as "embryonated," but even so they need not in the light of Alicata's work have been infective.] C. L.

DE BOER (E.). Experimentelle Untersuchungen ueber *Ascaris lumbricoides* des Menschen und des Schweines. [Research on *Ascaris* of Man and Pigs.]—*Ztschr. f. Infektionskr. d. Haustiere*. 1935. Vol. 48. No. 4. pp. 248-269. [41 refs.]

In experiments made on sucking pigs with ascaris eggs from pig and man, worms of full development have been grown from eggs coming from both sources, a fact speaking for the physiological identity of the two forms. Infection took place with difficulty on a diet poor in vitamin A.

Before the birth of the piglets search by a Kofoid and Barber technique using a saturated solution of common salt [s.g. 1,200] was made with a view to seeing that the mother's faeces contained no ascaris eggs. Even if they did not do so she was treated once, generally with oil of chenopodium, and if they did she was treated till the faeces were egg-free. At the same time care was taken to keep the pens free from this infection.

Feeding was by eggs which had been cultured for at least 2 months at 26°C. in 1 per cent. formalin solution; that they had in them embryos was seen through the microscope, and that they were infective was made sure by infection of guineapigs.

Each of a litter of 9 was given on one occasion 100 to 10,000 eggs of ascaris from the pig; there was no development of worms 2 months later. Each of a second litter of 5 was given on one occasion ascaris eggs from man; in two which had had 750 and in two which had had 10,000 eggs there was no development, in one which had had 750 there were 25 worms. In a third litter of 7 fed on more than one occasion with eggs of pig ascaris, the number of eggs given and of worms seen later were respectively 35,000 and 4; 450,000 and 22; 35,000 and 32; 530,000 and 31; 35,000 and 95; 30,000 and 1; and 35,000 and 105. In a fourth litter of 7 fed on more than one occasion with ascaris eggs from man the corresponding figures were 6,800 and 2; 7,300 and 0; 6,800 and 0; 7,300 and 2; 402,000 and 2; 285,000 and 1; and 7,300 and 1. As to poverty of vitamin A, 7 sucking pigs whose mother was taking food poor in this were each given 21,000 ascaris eggs from the pig with no development of worms, and 5 of another litter of a similarly treated sow were each given 37,000 eggs of ascaris from man with development of 1 worm among them all. As to controls, in 5 of one litter kept under the same careful conditions but not fed on ascaris eggs, there was no infection; but in 13 of another litter whose mother was left heavily infected and with whom they were left till they were 44 days old two were without worms, and the others had from 1 to 41 when 2 to 3 months old. C. L.

MAPLESTONE (P. A.) & MUKERJI (P. K.). **An Improved Technique for the Isolation of Ascaris Eggs from Soil.**—*Indian Jl. Med. Res.* 1936. Jan. Vol. 23. No. 3. pp. 667–672.

An attempt to determine the degree to which a modification of the Caldwell's technique for recovering ascaris eggs from soil was in fact successful.

The Caldwell's method [this *Bulletin*, 1928, Vol. 25, p. 959] consists in the thorough mixing of infected earth with an antiformin solution, the eggs being then floated in sugar solution of a high specific gravity. Maplestone and Mukerji made a suspension of faeces of the consistency of gruel, strained it through a fine wire sieve, shook the filtrate well, estimated its egg content by Stoll's method, and added 2 cc. of it to 10 cc. of earth. This culture was set aside for about 3 weeks. In the first experiments 10 cc. of 30 per cent. antiformin were added to the culture, there was frequent stirring, and then an addition of "25 cc. of saturated salt solution" [if of a solution of common salt the whole fluid would have a s.g. of about 1,143]; practically no eggs were recovered. It being judged that this was the effect of the low s.g. of the diluted fluid, the other preparations, after frequent stirring in the antiformin solution in which they remained from 3 to 24 hours, were allowed to stand, the fluid pipetted off, the soil removed to D.C.F. tubes, saturated salt solution added [presumed s.g. about 1,200], and the whole subjected to D.C.F.F. after which the percentage of eggs recovered varied from 0 to 25.1 [average 5.54]. When the cultures were broken up in D.C.F. tubes, the antiformin being in contact with them for 1 hour only, when they were centrifuged, when the fluid was pipetted off and replaced with saturated salt solution, and when the whole was subjected to D.C.F.F., the percentage of eggs recovered was between 0.17 to 33.2 [average 6.5]. When cultures were frequently stirred in water, chlorine gas was bubbled through the suspension for 10 minutes, the preparation centrifuged, the fluid pipetted off and "saturated salt solution" put in its place, no eggs were recovered in eight experiments. When the culture was mixed with 10 cc. of 2.13 per cent. caustic soda (its strength in antiformin), stood for half an hour, and chlorine gas was bubbled through it, the percentage of egg recovery was—from cultures which had remained moist throughout 16.9 to 51.1 [average 32], and from cultures which had dried before being put in the caustic soda solution 2.4 to 32.4 [average 15].

[It may be thought from the wording used in the paper that the reviewer has advised a saturated solution of common salt for the floating of ascaris eggs. He has not. On the contrary, the evidence he has offered [this *Bulletin*, 1926, Vol. 23, p. 261] is that the actual average collections of ascaris eggs from solutions of watery consistency having different specific gravities (and got by D.C.F.F. from the same quantities of a centrifugal precipitate of the same faecal suspension 30 to 61 days old) were as follows: 203 for s.g. 1,150, 2,400 for s.g. 1,200, 2,748 for s.g. 1,250, and 3,431 for s.g. 1,300, and were not bettered by higher specific gravities of the floating fluid. In addition it needs note that embryos do not develop in ascaris eggs kept for these periods under water, though they do so in earth, and that if hookworm work is a guide embryonated eggs will not commonly float in any solution however heavy. Then again, to moisten embryonated ascaris eggs which have dried is the surest way to cause hatching [this *Bulletin*, 1929, Vol. 26, p. 548] and the embryos do not float

unless it is by accident. It follows that the methods suggested above cannot be depended upon to show the real infectivity of a soil sample, and needs note that the authors do not say they can, though the ordinary reader may well draw from the wording the conclusion that they do.] C. L.

MEYER MAY (Jacques). Réflexions à propos de deux cas d'ascaridiose. [Two Cases of Ascaris Infestation.]—*Bull. Soc. Méd.-Chirurg. Indochine*. 1935. Sept. Vol. 13. No. 7. pp. 951-962. [25 refs.]

In the first case an ascaris escaped into the peritoneum through the necrotic wall of the gall bladder, in the second through a rent in the intestine caused by the host being run over by a car. C. L.

D'EMPAIRE (J. R. Hernandez). Obstrucción intestinal causada por ascarides.—Reprinted from *Rev. Soc. Méd.-Quirúrgica d. Zulia*. 1935. Sept. Vol. 9. No. 9. 8 pp. [26 refs.] French summary. Also in *Gac. Méd. de Caracas*. 1935. Dec. 31. Vol. 42. No. 24. pp. 369-373. [25 refs.]

CARBONELL Y SALAZAR (A.) & RODRÍGUEZ Y REMOS (C.). El diagnóstico radiológico de la ascariasis intestinal y su importancia quirúrgica. [Radiological Diagnosis of Intestinal Ascariasis and Its Surgical Importance.]—*Vida Nueva*. 1936. Jan. 15. Vol. 37. No. 1. pp. 83-94. With 3 figs. [36 refs.]

The authors describe their technique as follows: An opaque [barium] meal is administered to the fasting patient and half an hour later the first radiograph is taken, the second in an hour and thereafter hourly till the head of the barium column reaches the caecum, and a final one when the whole has passed from the small intestine. The radiographs are taken with the patient lying on his back. The fluoroscope is used as a control for taking the radiographs at the best times. If the worms are numerous a single picture will usually suffice. The examination is valuable also where only males or unfecundated females are present and no eggs are found in the faeces. From the surgical point of view it is of value in preventing unnecessary operative procedure when a patient comes under observation for obscure abdominal symptoms.

The authors state that Taeniasis is similarly demonstrable.

H. H. S.

MAY (J. Meyer). Ascaridiose et radiologie.—*Bull. Soc. Path. Exot.* 1936. Feb. 12. Vol. 29. No. 2. pp. 141-145.

VASSILKOVA (Z.). [Dehelminthization of Faeces containing the Ova of *Ascaris lumbricoides*.]—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 4. pp. 288-298. [In Russian.]

The author describes the results of experiments upon the action of various chemicals upon ascaris eggs. These were isolated from the uterus of the female worms into glass receptacles, covered with Barbagallo's fluid and incubated at 24°C. The effect of the chemicals was tested on unsegmented eggs, those in the stage of 4 blastomeres and on eggs containing a fully-developed embryo, both in pure culture and mixed with faeces. After subjecting the ova to the action of the

chemical in the incubator, they were centrifuged, washed in saline and again placed in the incubator. The effect of the treatment was judged by the subsequent appearance and viability of the eggs and embryos. The following proved to have no effect upon the eggs: "silver water" (water filtered through silver-bearing sand), chlorinated water (Cl content 28 to 450 mgm. per litre) and 50 per cent. creolin solution acting for $3\frac{1}{2}$ hours. The development of the embryos was retarded by 5 per cent. creolin (5 hours), 4 per cent. carbolic acid (5 hours) 5 per cent. lysol ($3\frac{1}{2}$ hours), creosote 1 : 120 (5 hours), 10 per cent. caustic soda and 20 per cent. chloride of lime after prolonged exposure. Complete destruction of the eggs was effected by the following: 5 per cent. carbolic acid (5 hours), 10 per cent. lysol (5 hours), 2 per cent. cresole (3 hours), creosote 1 : 60 (5 hours), 2 per cent. mixture of sulphuric acid (1 gm.), cresole (1 gm.) and water (48 gm.) (5 hours), while quick lime and chlorinated water (650 mgm. Cl per litre) had a rapidly fatal action.

C. A. Hoare.

LANDE (P.) & SIGALAS (R.). *Ascaridiose et médecine légale. [Ascaris Infestation and Forensic Medicine].—Gaz. hebdomadaire de Médecine de Bordeaux.* 1936. Feb. 9. Vol. 57. No. 6. pp. 82-84.

A child of 5 died with convulsions, vomiting and diarrhoea, and poisoning was suspected. Autopsy showed a mass of 19 ascaris about 20 cm. above the ileo-caecal valve and no trace of poison.

C. L.

LAMSON (Paul D.) & BROWN (Harold W.). *Methods of testing the Anthelmintic Properties of Ascaricides.*—*Amer. J. Hyg.* 1936. Jan. Vol. 23. No. 1. pp. 85-103. With 1 fig. [41 refs.]

A report on *in vitro* and *in vivo* tests against *A. lumbricoides* from the pig by hexylresorcinol, 6-hexyl-m-cresol, O-heptylphenol, santonin, carbon tetrachloride, tetrachlorethylene, chenopodium, and thymol.

The thoroughly washed worms were placed in normal saline in 400 cc. beakers, the fluid being held at a temperature of 37°C. and kept mixed by a power-driven glass propeller from which the worms were kept away by a gauze screen. The drug tested was added in quantity enough to form a 1 in 1,000 solution or suspension. Death was judged to have taken place if a worm did not show "definite motion in both directions" when dropped into water at 60°C. As to determination of stools negative for eggs, "the three methods most generally used for this are direct centrifugal flotation, which is the most accurate for a determination of absolute negativity, flotation [by which from the reference to the literature seems to be meant direct gravity flotation], and the dilution egg-count . . . we have come to the conclusion that the Stoll egg-count is of great practical value in determining the efficiency of drugs against ascaris, hookworm and whipworm. . . . We have been impressed by the value of a study of the percentage of negative cases after treatment as an index of anthelmintic efficiency."

"We are of the opinion that both *in vitro* and animal *in vivo* anthelmintic tests are of great aid in determining the probable action of a drug in man. *In vivo* anthelmintic tests in animals, as those on dog Ascaris, in testing a human ascaricide are simple and usually effective. The maintenance of large numbers of dogs is, however, very expensive. *In vitro* tests, on the other hand, are inexpensive and allow observation of the effect of drugs on

the worm which cannot be carried out *in vivo*. *In vitro* methods are of great value for orientation experiments especially where a large series of related compounds are to be studied.

"The final test of any anthelmintic is its action against that parasite in which one is interested in its normal host. For such a test in human ascariasis and hookworm disease the Stoll egg-counting method is our choice.

"The need for thorough study of the pharmacological action of new drugs before their use in man is emphasized. Ascariasis and hookworm disease are not usually fatal diseases, thus safety should be the primary requisite of any anthelmintic."

The Table shows the results obtained. [Those of santonin are of interest in confirming the findings of TAKAME & ASADA that it is not santonin which kills ascaris but some substance which the host's body makes from it. The authors do not mention this point but it is the really essential one in judging of the extent to which *in vitro* experiments are of any real value in grading anthelmintics. Nor in the consideration of the action of thymol in man do they make mention of the evidence suggesting that in its case too the body of the host alters it to something else, so that, if that is so, its action *in vitro* is no proof of its anthelmintic worth in man; nor for that purpose do they refer to the essential need of its proper participation.]

C. L.

ROSSI (J. E.). La calciocianamide nella lotta contro le strongilosi. (Ricerche sperimentali.) [**Calcium Cyanamide in combating Ankylostomes.**]*—Arch. Ital. Sci. Med. Colon.* 1935. Oct. Vol. 16. No. 10. pp. 715-721.

The disinfectant and vermicial action of calcium cyanamide has been proved in the laboratory but the author here reports experiments carried out by him on prepared plots of ground to imitate as nearly as he could natural conditions.

He took three small portions of land 4 by 6 metres, separated by netting. The grass was removed and the earth broken up a little. A culture of larvae of *A. caninum* was sprinkled on two of these; one was left thus, and on the other was distributed the cyanamide mixed with street dust in the quantity employed in agriculture, 960 gm. on the experimental area, equivalent to 4 quintals per hectare. On the third were placed the faeces of dogs passing *A. caninum* ova in quantity; the faeces had been collected for 6 days and kept in the cold to prevent development, then mixed with straw and left for 3 days in the open (temp. 24°C.) to develop; next this was mixed with 8 gm. cyanamide per kilogram of "manure," about the proportion used in agriculture. Two dogs, which repeated examination had shown to be free from ankylostomes, were then placed on each plot, and their faeces examined.

Those on the control plot were passing typical ova on the 38th and 41st days respectively, those on the second (where the cyanamide had been sprinkled directly on the ground) were passing ova in small numbers from the 45th day, those on the third (with the mixed faeces and cyanamide) were never found positive. On the 60th day an anthelmintic was given to all six, and the two on the control plot passed 68 and 92 hookworms, those of plot 2 none, one on plot 3 none, the other 7. A few days later, another examination revealed that those on the control plot were still passing ova, but none of the others.

The effect of various anthelmintics against pig Ascaris in vitro, Ascaris in dogs, and Ascaris in man

	Hexyl-resorcinol	6-Hexyl-m-cresol	O-heptyl-phenol	Santonin	Carbon tetrachloride	Tetra-chlorethylene	Chenopodium	Thymol
Pig Ascaris in vitro	Killed 100% in 2' Killed 90% in 1' (1-1000 suspension in saline)	Killed 100% in 30' Killed 90% in 20' Killed 60% in 10' Killed 40% in 5' Killed 10% in 2' Killed 10% in 1' (1-1000 suspension in saline)	Killed 100% in 30' Killed 90% in 20' Killed 65% in 10' Killed 10% in 2' (1-1000 suspension in saline)	Killed 0% in 3 hrs. (1-1000 suspension in saline)	Killed 10% in 3 hrs. (1-1000 suspension in saline)	Killed 100% in 2 hrs. Killed 80% in 1½ hrs. Killed 10% in 1 hr. (1-1000 suspension in saline)	Killed 100% in 30' Killed 85% in 20' Killed 60% in 10' Killed 70% in 5' (1-1000 suspension in saline)	Killed 100% in 30' Killed 90% in 20' Killed 20% in 10' Killed 10% in 2' (1-1000 solution in saline)
Ascaris in dogs	0.050 gm./kg. removed 100% 0.025 gm./kg. removed 70%	0.200 gm./kg. removed 97% 0.100 gm./kg. removed 68%	0.2 cc./kg. removed 74% 0.1 cc./kg. removed 46%	0.025 gm./kg. removed 23% 0.013 gm./kg. removed 25% 2 doses removed 70%	0.3 cc./kg. removed 100% 0.1 cc./kg. removed 68%	0.2 cc./kg. removed 100% 0.1 cc./kg. removed 94%	0.1 cc./kg. removed 100% 0.05 cc./kg. removed 71%	0.100 gm./kg. removed 100% 0.050 gm./kg. removed 88%
Ascaris in man	1.0 gm. removed 90% cured 70% 1.0 gm. removed 96% cured 72%	4.2 cc. removed 49% cured 5%	4.2 cc. removed 38% cured 9%	0.32 gm. removed 87.3% cured 80% 0.32 gm. removed 92% 0.32 gm. removed 20-66%	1.5-3.0 cc. removed 2.7% cured 9.4% 3.0 cc. removed 22.2%	3.0 cc. removed 35.6% 4.0 cc. removed 0% 3.0 cc. removed 0%	1 gtt. per yr. age cured 94% 1.5 cc. removed 69.8% cured 35.9% 1.5 cc. removed 83.2% 2.0 cc. removed 94.9%	3.0 gm. removed 20% 4.0 gm. cured 18.6% 6.0 gm. removed 32.7%
Toxicity to rats	0.35 gm./kg. killed 50%	2.3 cc./kg. killed 50%	2.8 cc./kg. killed 50%		1.9 cc./kg. killed 40% (3.04 gm.)	4.0 cc./kg. killed 40% (6.4 gm.)	0.08 cc. ascaridole killed 50% (Equivalent to 0.11 cc. chenopodium)	0.27 gm./kg. killed 50%

Calcium cyanamide would, therefore, appear a good disinfectant for infested land, but, as the author rightly points out, experiments such as these cannot quite imitate natural conditions, for there the distribution of the cyanamide is not likely to be uniform, nor would it all directly reach the soil, and thirdly the larvae would not be evenly distributed.

H. H. S.

ERRATUM.—Vol. 33, No. 2, p. 111, in first line of summary of paper by STÉVENEL & BERNY on the destruction of hookworm eggs and larvae, for cyanide of calcium read cyanamide of calcium.

LEATHERS (W. S.) & KELLER (A. E.). **Investigations concerning Hookworm Disease in Southern States with Suggestions for Continued Control.**—*Southern Med. J.* 1936. Feb. Vol. 29. No. 2. pp. 172–177. [11 refs.]

The paper's title is the measure of its range. The hookworm is still a cause of danger and damage in these parts.

There are set out the facts which were collected by the Rockefeller Sanitary Commission in 1910 to 1914, which were based on faecal smears from 205,825 persons of which 41·8 per cent. were positive. Side by side with these are those of examinations made by the authors by the Stoll-Hausheer egg counting method using 0·005 gm. of faeces from 106,577 persons, of whom 14·1 per cent. were positive. A table converts egg counts into worm loads on a regular scale whatever the load [an action which HILL's work (this *Bulletin*, 1927, Vol. 24, p. 196) shows to be wrong], but fortunately in all other tables the counts themselves are given. "It is difficult to determine at what intensity of hookworm infestation clinical symptoms are likely to appear, but for practical purposes an infestation of 2,600 eggs per c.c. of feces, or approximately 100 hookworms, is found to be the level at which symptoms will probably occur." [RAMSAY's words on this problem (*ante*, p. 551) are "The work of such authorities as Stiles and Lane has amply proved that even the very lightest infections with hookworm have a deleterious effect on the individual." As to the egg-worm ratio, if the mean weight of the stool is taken as 100 gm. and the usual egg output for a single female *Necator* taken as 10,000 eggs, then 100 *Necators* half of them females will give 5,000 eggs per gram of stool. Perhaps the mean stool is taken as being of over 200 gm. but note is not made of this important point.] To the method of diagnosis used, South Carolina showed the highest percentage of infected persons and the largest egg counts; but with the low percentage of infected persons in Tennessee of 6·9 there were persons with high egg counts. It is shown in addition that hookworm infection is often a family problem [yet another pointer to dejectional infection] and that when one member is found infected the others should be examined. These are their suggestions for continued control:—

"Proper excreta disposal has not been observed uniformly. However, the Federal agencies have cooperated with state and local health organizations in field operations for building sanitary privies. The emphasis which is now being placed upon this phase of rural sanitation should greatly accentuate the value of proper excreta disposal."

In discussion it was pointed out by Dr. D. G. GILL that even now a number of rural schools are serving as disseminators of hookworms as well as of learning, and in closing Dr. KELLER said "After an analysis

of the data from counties with full-time health departments and counties without full-time health departments, we were not able to determine that there was any difference in the rate of decrease in the incidence of hookworm." *C. L.*

KELLER (A. E.), LEATHERS (W. S.) & JENSEN (M. H.). **An Investigation of Hookworm Infestation in Thirty-Six Counties of Kentucky.**—*Amer. Jl. Hyg.* 1936. Jan. Vol. 23. No. 1. pp. 33-45. With 3 maps.

"Continued reductions in the incidence and intensity of hookworm infestation can only be brought about by the application of sanitary measures which will be effective in permanently preventing the transmission of this parasite. It would seem since there is such a low general intensity level that treatment, except in areas of high incidence, would not be very effective in bringing about the desired results. Provision for proper excreta disposal and careful sanitary supervision and maintenance would seem to offer the most rational solution of the problem. This would be effective also in preventing the transmission of the other intestinal parasites

"There are certain areas of high incidence of hookworm in Kentucky where on account of the economic status of the population it would be necessary to depend on treatment in great measure to improve the health of individuals residing there. Under these conditions treatment could be used as a stimulus to arouse interest in this problem and to obtain the cooperation of the people. It is likely that where this was done permanent measures could be eventually instituted.

"The studies should be extended, especially in the localities where the incidence of hookworm is highest. These relatively small areas at the present time are the ones most in need of systematic programs of control by the official health agencies. If control measures could be more uniformly carried out it would be possible to practically eradicate hookworm in Kentucky." *C. L.*

OTTO (G. F.). **Localized Centers of Hookworm Disease in Kentucky and North Carolina.**—*Amer. Jl. Hyg.* 1936. Jan. Vol. 23. No. 1. pp. 157-168. [15 refs.]

Over 6,000 persons were examined in the States noted in the title and the results are set out.

Examination was by Stoll's egg counting method and hookworm infection is still a problem. This is shown for example by comparing the 3 counties in which faeces were examined in 1914 by smear by the Rockefeller Foundation with the figures now got in these same counties, their respective percentages of infection being 83.1 and 48.4, 36.9 and 19.6, 56.8 and 33.3. The county percentage of incidence now varies from 0 among 78 persons examined (from 2 counties) to 54.7 among 872 and 58.3 among 824 in 2 other counties. The mining communities have less infection than the general, this varying from about 11 to 13 per cent. Women out of their teens are more often infected and have higher egg counts than men of the same age period. There are hookworm families. In Columbus County 27.3 per cent. of 815 rural whites showed infection to the method of examination used, against 12.3 per cent. of 716 negroes, while school children showed 34.4 per cent. as against 37.9 per cent. in 1914. Details of two heavily infected families are given, one of which had frequently moved to escape "persecution" by health and school authorities, and the other had thrown away the carbon tetrachloride given them. "A relatively small

percentage of the rural schools in these 7 counties have any privies at all and only a negligible few had approved sanitary privies."

C. L.

SCOTT (J. Allen). **Factors in the Epidemiology of Hookworm in Egypt.** [Abstract.]-*Jl. Parasitology*. 1935. Dec. Vol. 21. No. 6. p. 430.

"A study of the distribution of hookworm in Egypt has revealed the following facts: 1. As known for many years, the percentage incidence of infestation is generally high. 2. Certain districts, however, having a very low incidence have been discovered. Furthermore, high incidence villages have been found immediately adjoining low incidence villages. 3. Although Egypt has long been a classic center of hookworm disease, the intensity of infestation is very low. There is no evidence of any great reduction in recent years. As judged by the egg count, relatively few cases have a sufficiently large number of worms to place them in groups of probable clinical significance in the classifications given in the literature, even though due allowance is made for the species concerned, viz. *A. duodenale*. Since, however, this infestation is commonly superimposed on infestations of schistosomes and other parasites, the rôle of hookworm in the cumulative clinical effect is of undoubted importance. The situation is only partially explained by the hot, arid climate. Two further observations have thrown light on the problem. A study of the defaecation habits of the people has shown that soil pollution does not tend to be concentrated in places where intense soil infestation would result. Development of hookworm larvae is completely inhibited in cultures of soils from many common defecation areas. As the effect is independent of the sand or clay content of the soils, the factor involved appears to be of a newly recognized type in the natural control of hookworm. Under these conditions it seems obvious why intense human infestations are not built up, even though a high percentage incidence of low grade infestation is general."

TUBANGUI (Marcos A.), BASACA (Mariano), PASCO (Antonio M.) & DEL ROSARIO (Fidel). **Observations on the Geographical Distribution of Hookworm Parasites and Hookworm Disease in the Philippines.**-*Philippine Jl. Sci.* 1935. Dec. Vol. 58. No. 4. pp. 447-477. With 7 figs. [21 refs.]

The results of a quantitative hookworm survey in the Philippines. The stools of 2,357 persons from different areas were examined by the Stoll-Hausheer method (0.005 gram), the figures being brought to a formed basis with allowance for size of stool. They have then a comparative value [though they cannot show the real position]. The incidence and the intensity, so judged, are highest in Cebu, Leyte, Cotabato and Camarines Sur, and in those places the mean haemoglobin percentage is lowest, especially in persons having egg counts of over 10,000 per cc. of faeces. Habits are the same all over the islands in defaecation and in going barefoot, and the difference in the weight of infection is put down to rain distribution and soil moisture, with a suitable temperature.

The hookworm is a problem in these islands, the contrary view being the result of examinations made in Manila where there is little of the infection [so that the position is as it was in 1923 (this *Bulletin*, Vol. 21, pp. 226-7)]. C. L.

LAMBERT (S. M.). **A Resurvey of Hookworm Disease in Fiji in 1935, Ten Years after Mass Treatment.**—*Jl. Trop. Med. & Hyg.* 1936. Jan. 15. Vol. 39. No. 2. pp. 19-21.

"Mass treatment of hookworm disease among primitive people is an effective means of bringing the disease under control.

"A resurvey of hookworm disease in Fiji in 1935, ten years after mass treatment, indicated that infection was only half of what it had been before the treatment campaign, and that infection was less severe in form. After ten years there were still few clinical manifestations of hookworm disease in areas where formerly there had been almost universal anaemia. The slow return of hookworm infection is attributed to a higher standard of soil sanitation introduced after 1922. Systematic treatment of hookworm cases by district medical officers and native medical practitioners under their direction would probably obviate the need of further mass treatments." C. L.

KELLER (A. E.), GOOGE (J. T.), COTTRELL (H. B.), MILLER (D. G.), Jr. & HARVEY (R. H.). **Clinical Study under Controlled Conditions of 1,083 Children with Hookworm.**—*Jl. Amer. Med. Assoc.* 1935. Nov. 23. Vol. 105. No. 21. pp. 1670-1675.

"This study shows that there is a correlation between the physical condition of children infested with hookworm and the worm burden. This relationship is not striking, however, until the intensity of infestation reaches a level of moderate to heavy infestation (100 or more hookworms)."

Faecal specimens were examined from 1,083 school children (or 59 per cent. of those of school age) by Stoll's method of dilution in caustic soda and by "the salt flotation method" [which of these with their varying worth being unstated]. The egg counts are taken as pointing in strict proportion to the worm loads and conclusions are stated in terms of worm loads; in spite of demonstrations by American workers themselves—HILL [this *Bulletin*, 1927, Vol. 24, p. 196] for human infections and SARLES [this *Bulletin*, 1930, Vol. 27, p. 423] for those of the dog—that as the number of worms harboured increases the egg output by each worm becomes less. Of the 1,083 specimens, 58 per cent. were positive to Stoll's method and 19.9 per cent. more to "salt flotation." The old knowledge is reaffirmed that there is some parallelism between the worm load and such symptoms as fatigue, weakness, dyspnoea and oedema. "There is rather marked variation in the light intensity groups and it is only when an infestation of 100 worms or more is reached that there is decided increase in the percentage of individuals complaining of these symptoms." A history of ground itch was rather commoner in those found positive at the time of examination than in those which were not. A table shows that the least amount of underweight was shown by those with "0 to 24 worms," that the nutritional condition was worst in those with "1,001 worms and over," that pallor was least in those with "101 to 500 worms,"

and diseased teeth and tonsils least in those with "1001 worms and over." Red cells were highest in those with "51 to 100 worms" namely 3,575,000 as against 3,445,000 in those with "no worms," though the haemoglobin fell steadily from 10.1 grams per cc. as the presumed worm load increased. Eosinophils were in the mean 9.6 per cent. among those in whom eggs were not seen. "With the increase in the intensity of infestation the diet became more inadequate in substance except vegetables" a presumed pointer to poverty and its attendant conditions. "Hookworm control now should be considered as part of a well balanced public health program. . . . Attention should not be focused on hookworm infestation alone."

C. L.

PEÑA CHAVARRÍA (A.) & ROTTER (Werner). Untersuchungen ueber die Hakenwurmanämie. [**Studies on Hookworm Anaemia.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Dec. Vol. 39. No. 12. pp. 505–516. With 2 figs. [17 refs.]

In effect the paper is in two parts, a consideration of the cause of hookworm anaemia and a statement of the frequent discovery in this condition of venous thrombosis and embolism.

For the investigation of hookworm anaemia a group of 80 children has been chosen between 6 and 12 years of age. The conclusion is that lack of iron in the organism plays a decisive part in causing hookworm anaemia, for this anaemia is most marked in those cantons where the amount of flesh eaten is least, while the ordinary diet of these people has in it little iron-containing chlorophyl, and at autopsy the iron reaction in the organs (spleen, liver, kidneys, bone marrow, heart muscle and lymph nodes are mentioned) is completely absent, which is not the case in mere alimentary anaemia; so to that extent the hookworm's blood sucking is allowed a share in the matter. The anaemia can be cured by iron without deworming, and deworming without iron does not cure it. In a typical reticulocyte curve after removal of 526 hookworms by carbon tetrachloride (the drug of the authors' choice) and the giving of Damesk's treatment with iron and ammonium citrate in 25 per cent. watery solution in doses of 6 to 8 gm. daily, the reticulocyte response after each of 3 courses of treatment was 20, 13 and 6 per cent. by which time the red cells had risen from 2 to 3.75 millions and the haemoglobin percentage from 15 to 65. There is no hint as to whether deworming was complete after treatment. As to the state of the bone marrow in the right femur, postmortem examination of 96 cases showed that erythropoiesis was complete in 41 cases, extended to half the bone or more in 35, and to less than half in 20. In the heaviest cases an aplastic marrow was common. It is held that very probably the small continued blood losses caused by the worms in their sucking and perhaps also hindrance to absorption caused by changes in the intestinal wall have an essential share in causing this iron-starvation anaemia.

Thrombosis and embolism were astonishingly common at autopsy. The former were seen in 59 of the 96 cases, while fatal emboli were present in 12, and minor ones in 34. Cases are cited to show the importance of these changes in causing death in hookworm anaemia.

C. L.

CRUZ (W. O.). Sobre a significação da eosinophilia na ankylostomose. [The Significance of Eosinophilia in Ankylostomiasis.]—*Mem. Inst. Oswaldo Cruz.* 1936. Vol. 31. No. 1. pp. 1-10. [15 refs.]

The author has investigated the presence of eosinophilia and its degree in different stages of hookworm infestation. The eosinophilia found early is associated with migration of the larvae. Later it is due, he maintains, to heterologous albuminous substances secreted by the worms in the intestine and believes that withdrawal of eosinophile cells from the circulation to the local site leads by stimulation of the bone-marrow to stronger haemopoiesis, at least increase of leucocytes, and this stimulation continues as long as the helminthic secretion persists. Even though the anaemia is cured the eosinophilia may persist on account of these heterologous albumins. H. H. S.

WALTERS (A. H.) under the direction of G. Carmichael Low & P. H. MANSON-BAHR. Treatment of Ankylostomiasis in Indian Seamen.—*Lancet.* 1936. Mar. 14. pp. 599-600.

A confirmation of the digestion of worms after an anthelmintic seeing they are not found in stools, though eggs are no longer present, a comparison of the value of D.C.F. with the smear, and of the worth of certain anthelmintics.

Of the 37 cases in question, and in whom infection was in fact displayed by D.C.F., the faecal smear was negative in 28; worms were recovered in 6 only. When seen again 5 to 12 months later eggs were present in 2 of 8 cases in which treatment had been by thymol, in 2 of 6 cases in which it had been by oil of chenopodium, in 2 of 6 cases by carbon tetrachloride and in none of 17 cases given a combined treatment of the two last consisting of 40 minims of carbon tetrachloride and 15 minims of oil of chenopodium of unstated ascaridole content, the drugs given separately in gelatin capsules. It is suggested that the infections were got in childhood, that the worms had become embedded in the wall of the small intestine and that the reappearance of eggs was due to relapse and not to fresh infections [see, however, this *Bulletin*, 1935, Vol. 32, p. 258]. No cases had been discharged as dewormed until the faeces had been free of eggs for at least 7 days after treatment. C. L.

PORTUONDO DEL PINO (A.) & FERMOSELLE BACARDÍ (J. J.). Contribución al tratamiento de los casos graves de ankylostomosis. [Treatment of Severe Ankylostomiasis.]—*Rev. Parasit., Clin. y Lab.* Habana. 1936. Jan.-Feb. Vol. 2. No. 1. pp. 99-103.

The author records the case of a woman admitted to hospital suffering from enteric fever a month after her confinement. When the temperature became normal she was noticed to be very anaemic, and examination of the stools revealed hookworm ova in large numbers, 10 or more per field [apparently by direct examination]. She was given 30 drops of oil of chenopodium in castor oil. A fortnight later there was no improvement; ova seemed to be just as numerous, haemoglobin was still 15 per cent. only and her general state was very poor. She was given a blood transfusion of 200 cc. and improved. Six days later she was given by duodenal sound 30 cc. Necatocida Kuba in castor oil (Necatocida Kuba has a basis of oil of chenopodium and CCl_4). A week later, ova were fewer, and a second dose of the Necatocida was given, and after 7 days examination showed one or

two ova in some fields, in others none. Later, a third dose was given, also by duodenal sound, and since then no ova have been seen. The author maintains that in very severe cases of hookworm infestation, the correct procedure is transfusion of blood and administration of the anthelmintic by duodenal tube. H. H. S:

CAMERON (G. R.) & KARUNARATNE (W. A. E.). **Carbon Tetrachloride Cirrhosis in Relation to Liver Regeneration.**—*Jl. Path. & Bact.* 1936. Jan. Vol. 42. No. 1. pp. 1-21. With 14 figs. (13, 3 coloured, on 5 plates) & 1 chart. [84 refs.]

"Our object in this paper is to describe experiments with carbon tetrachloride designed to throw some light on the relationship of repeated liver damage to the development of cirrhosis. Information on the pathology of acute and chronic carbon tetrachloride poisoning is also brought forward," and regeneration is studied.

The first object of the paper is not, the second and third are, of great direct interest to those who give hookworm treatments. This note is limited to the points of direct interest. The experiments were made on albino rats with an average weight of 150 grams, the drug being given hypodermically to nearly all of them. With a single dose the smallest amount causing histological change in the liver (the minimum toxic dose for rats) was 0.016 to 0.033 cc. per kgm. of body weight. Facts giving proof of regeneration were of three sorts. First directly histological, nuclei being giant, or mitotic, or there being more than one in a cell; unusual arrangement of liver cells; growth of new bile ducts; and seeming increase of fibrous tissue but the appearance being in fact due to death and absorption of parenchymal cells. Second the taking away at operation of half to two-thirds of the liver, a loss made good in the normal rat in 14 days. Third the aseptic grafting in a healthy rat of some of its liver into its omentum, where the structure of the graft undergoes no change in 14 days.

"After a single toxic dose of carbon tetrachloride there is little evidence of change in the liver, except for diffuse congestion, until between the fifth and twenty-fourth hours. Hydropic and fatty degeneration then appear in the liver cells of the central and mid-zonal regions of the lobules. The extent of the degeneration and its tendency to pass on to necrosis depend on the size of the dose. The altered cells map out a complicated lobular pattern. The damaged areas are soon invaded by leucocytes and especially by histiocytes, the Kupffer cells of the unaffected parts becoming more prominent and perhaps contributing to the increased cellularity. By the third day removal of damaged and necrosed liver cells is proceeding, laying bare the mesenchymal supporting stroma and the sinusoids. Repair is going on actively, chiefly through mitotic division of the healthy liver cells, not only at the borders of the areas of necrosis but diffusely throughout the organ. The portal canals frequently contain more cells including lymphocytes, histiocytes and some fibroblasts. By the seventh day the dead tissue has been removed. Repair is complete by the fourteenth day. At no time is there any sign of bile-duct proliferation."

There is no need to put out in detail the outcome of doses given in series to rats, but this footnote is important:—

"One of us (W.A.E.K.) has personally investigated in Ceylon a case of severe liver damage following rapidly repeated therapeutic doses of carbon tetrachloride together with chenopodium. The liver showed extreme fatty degeneration while the kidneys were intensely congested."

Though such a series of doses at short intervals is rarely given to man, yet the effect of these on liver regeneration in experimental animals has this lesson for those who give one dose only to man:—

"During the pre-cirrhotic stage between the sixth and twenty-first doses the liver reverts to normal on discontinuing the drug because the liver cells can still proliferate actively and make good the damage produced up to this stage. Later on, since its cells are becoming less capable of proliferating and of repairing any damage, the liver as a whole is less capable of a return to normal on removal of the toxic agent." It is added "Through the action of a number of widely varying toxic agents there results destruction of liver cells."

[That is to say it seems to be the case that should one of these toxic agents be at work when a dose of this drug is given, the giving of it may take the liver over the line limiting possible regeneration, with death as its outcome.] The point is made that "rats receiving repeated doses of carbon tetrachloride differ in the recuperative power of their livers." [This is the experience after one dose in man.] There is a valuable review of the literature. C. L.

BOULOS (A.). **Clinical Observations on Carbon Tetrachloride Poisoning.**—*Jl. Egyptian Med. Assoc.* 1936. Jan. Vol. 19. No. 1. pp. 20-33.

A résumé of the literature with this conclusion from personal experience:—

"In my experience the rate of mortality differs widely in different districts. In a locality like Mit Ghamr with heavy infection, besides the many cases that showed symptoms of intoxication, there are on record three fatalities amongst the few thousand cases treated in the last three or four years. At the same time in Beni Suef, with an extremely low percentage of both *ascaris* and *Schistosoma mansoni* infection, no case of death was reported and nobody showed any marked symptoms of intoxication during the last ten years."

DERVILLÉE (P.). L'intoxication expérimentale par le tétrachlorure de carbone. Données générales et recherches personnelles.—*Jl. Méd. de Bordeaux.* 1936. Feb. 10. Vol. 113. No. 4. pp. 91-102. With 2 figs. [32 refs.]

GARCIA (E. Y.) & AFRICA (C. M.). *Diphyllbothrium latum* (Linnaeus, 1758) Lühe, 1910, in a Native Filipino.—*Philippine Jl. Sci.* 1935. Aug. Vol. 57. No. 4. pp. 451-457. With 3 figs. on 1 plate. [11 refs.]

The first case of this infection reported from the Philippines.

A Filipino boy of 7 died of anaemia. The parasite was then passed. Past active helminthological surveys in the Philippines have never shown the infection. It occurred in a town where *Cyprinus carpio* was introduced 8 years ago. C. L.

KOURÍ (Pedro), BASNUEVO (José G.) & ARENAS (Rogelio). Contribución al conocimiento del ciclo evolutivo del *Strongyloides stercoralis*. (Nota previa.) [The Cycle of Evolution of *Strongyloides stercoralis*.]—*Rev. Parasit., Clin. y. Lab.* Habana. 1936. Jan.-Feb. Vol. 2. No. 1. pp. 1-6. With 13 plates & 1 fig. English summary.

"It is stated that during faecal culturing for 8 months there were obtained many generations of the parasite, *Strongyloides stercoralis*,

the later ones producing only rhabditiform larvae and egg-bearing females which have become parthenogenetic. At the same time intrauterine eggs become fewer and fewer. [It will be remembered (FAUST, this *Bulletin*, 1934, Vol. 31, p. 129) that the parasitic stages are after all not parthenogenetic, so the suggestion that this condition occurs in the free stages will hardly be accepted on the evidence offered.]

C. L.

KOURI (Pedro) & SELLEK (Antonio). Sobre el tratamiento de la strongyloidosis por el violeta de genciana. [**Treatment of Strongyloides Infestation by Gentian Violet.**].—*Rev. Parasit., Clin. y. Lab.* Habana. 1936. Jan.-Feb. Vol. 2. No. 1. pp. 7-16.

At the Municipal Hospital for Children, Havana, among 1,854 children whose stools were examined during a period of 14 weeks in the latter half of 1935, 15 were passing larvae of *Strongyloides stercoralis*. Previous methods of treatment—with oil of chenopodium, male fern, carbon tetrachloride, thymol, santonin; with injection of emetin and arsenicals, alone and combined—had proved ineffectual. Seven of the 15 have been treated with gentian violet, 1 or 2 capsules daily, each containing 0.05 gm., according to age; the dosage was regulated as 1 cgm. daily for each year of age. The effect of treatment was controlled by microscopical examination of the faeces. In 5 of the 7 patients larvae disappeared within the week and did not recur; in 2, 1 of whom received the dye for 8 days, the other for 10 days, larvae were still being passed, so after a week's interval the drug was resumed, and in 3 days more larvae were no longer seen. Two suffered from nausea and vomiting, but not severely. The dye had no action on hookworm, trichuris or ascaris.

H. H. S.

BEACH (Ted de Vinne). **Experimental Studies on Human and Primate Species of Strongyloides. V. The Free-living Phase of the Life Cycle.**—*Amer. Jl. Hyg.* 1936. Mar. Vol. 23. No. 2. pp. 243-277. [22 refs.]

The experiments deal with *Strongyloides simiae*. Perhaps the following is of importance for man:—

"Free-living adults of the first, second, and third generations were grown on artificial culture media. Filariform larvae were produced from all 3 generations as well as eggs and rhabditiform larvae of the fourth generation. An actual count made of 1 culture at the termination of the experiment showed 629 offspring present, a number which would be expected from 4 first generation and 6 second generation, females. This continuation of the sexual free-living cycle is believed to occur normally in nature under optimum conditions. Attempts to transplant larvae and adults to fresh culture media were unsuccessful."

C. L.

CHANDLER (Asa C.). Studies on the Nature of Immunity to Intestinal Helminths. III. Renewal of Growth and Egg Production in *Nippostrongylus* after Transfer from Immune to Non-Immune Rats.—*Amer. Jl. Hyg.* 1936. Jan. Vol. 23. No. 1. pp. 46-54. With 1 fig.

OTTO (G. F.). **Blood Studies on Trichuris-infested and Worm-free Children in Louisiana.**—*Amer. Jl. Trop. Med.* 1935. Nov. Vol. 15. No. 6. pp. 693-704. [34 refs.]

There is nothing to make for the belief that trichuris infection was the cause of any change in the blood picture.

Faecal examination was by the Stoll-Hausheer method [which uses 0.005 cc. of faeces] and, in most of those in whom no eggs were seen by it, D.C.F. was used in addition.

"The blood picture was studied in 550 rural white children 5 to 14 years old in south-central Louisiana. Of these 197 were infected with trichuris; 140 with trichuris and some other intestinal worm, usually ascaris; and 213 were worm-free. The blood picture was essentially the same in all groups, i.e., 11.22 to 11.52 grams hemoglobin per 100 cc. blood; 4.5 to 5.0 million erythrocytes per cmm. blood; mean corpuscular hemoglobin of 23.0 to 23.7 micro micrograms; and a relative lymphocytosis of 46.4 to 47.2 per cent. These children are known to suffer from under-nourishment and it is suggested that most of them, both parasitized and worm-free, suffer from a nutritional anaemia." C. L.

BATTAGLIA (Alberto) & ARATA (Esteban C.). *Anemia perniciosa por tricocéfalos trichiurus*. [**Pernicious Anaemia and Trichuris Infestation.**]—*Prensa Méd. Argentina*. 1936. Apr. 29. Vol. 23. No. 18. pp. 1094–1101. [15 refs.]

A case is recorded of an Italian woman, 29 years of age, who had suffered for some 6 months with vague abdominal pain, attacks of vomiting, increasing pallor and emaciation. Her blood contained 1,870,000 red corpuscles and 2,800 leucocytes per cmm., haemoglobin 60 per cent., colour index 1.6; there was marked anisocytosis, poikilocytosis with megalocytes and erythroblasts. No malaria parasites were found, the W.R. was negative; in fact the only cause discoverable was the presence of *Trichuris trichiura*. The anaemia slowly cleared up after treatment, the details of which are not given. H. H. S.

UJIMA (N.). **On Acute Appendicitis connected with Intestinal Parasites.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1935. Nov. Vol. 34. No. 11 (368). [In Japanese pp. 1773–1789. With 10 figs. on 1 plate. [67 refs.] English summary pp. 1789–1790.]

The author examined macroscopically and microscopically 330 appendices removed for acute appendicitis in Taihoku, a subtropical part of Formosa. Twenty-three, or 7 per cent., showed signs or actual presence of helminthic affection; 20 with *Enterobius*, 2 with *Trichuris* and one with *Ascaris*. In four of the *Enterobius* cases, the *Ascaris* and one of the *Trichuris* cases, apart from mere irritative and traumatic lesions of the mucosa, there was invasion by bacteria and definite inflammatory changes. The former has been named by ASCHOFF *Appendicopathia oxyurica*. H. H. S.

HEATHMAN (Lucy S.). **Laboratory Diagnosis in Trichinosis.**—*Amer. Jl. Hyg.* 1936. Mar. Vol. 23. No. 2. pp. 397–409. With 2 charts. [23 refs.]

After reviewing the relevant literature on this subject the authors analyse the results of intradermal and precipitin tests obtained in 55 patients who contracted trichinosis in 7 different outbreaks. Only one case was fatal.

The technique employed in the preparation of antigen was similar to that of BACHMAN (1928) for both precipitin and skin tests, and in 26 instances antigens supplied by Bachman as well as those prepared

in the local laboratory were used. In performing the skin test in man the immediate type of reaction described by AUGUSTINE & THEILER (1932) was observed; in only a limited number of cases were observations on the delayed reaction made.

In 22 out of 44 cases (50 per cent.) the skin tests showed an immediate positive reaction. In only 22 patients was a delayed reaction looked for; it was present in 11 (50 per cent.). Of these 7 had shown no immediate reaction. In 22 children used as controls none gave positive reactions. Precipitin was present in 30 out of 42 sera, *i.e.* 68.2 per cent.; the majority reacted to a 1 in 6,000 dilution of antigen. An eosinophilia of 10 per cent. or more was noted in 93.2 per cent. of cases and in 39 persons it exceeded 20 per cent. In the one fatal case, infected 38 days previously, blood collected 4 days before death showed no eosinophilia; the skin test was also negative, but the precipitin test was strongly positive.

Only 13 out of 30 heavily infected guineapigs gave positive skin tests (*i.e.* 43.3 per cent.) and these appeared from the 7th to the 45th day. Only 3 out of 30 gave a positive precipitin test.

The author concludes that, though precipitin and skin antibodies occur in quite a high percentage of trichinosis patients, the reactions are not sufficiently early or regular to be of great diagnostic aid. They are less frequent in experimentally infected animals than in man. Eosinophilia, muscle biopsy and the study of suspected meat are regarded as of more value from the viewpoint of laboratory diagnosis.

N. Hamilton Fairley.

DIAZ MARTIN (Luis). Consideraciones sobre varios casos de triquinosis. [**An Outbreak of Trichiniasis.**]—*Medicina Paisés Cálidos*. Madrid. 1936. Feb. Vol. 9. No. 2. pp. 75–86. [10 refs.] [Summary appears also in *Bulletin of Hygiene*.]

The outbreak recorded here occurred in San Martín de Trevejo, Cáceres, in December, 1935; twenty-one individuals were attacked, members of one family and their friends, and infection arose from ingestion of pork sausages made at home for a family celebration. The ages of the patients ranged between 2 and 56 years. The symptoms were typical and eosinophilia was present in nearly all, ranging between 6 and 40 per cent., but two who presented other characteristic symptoms had no eosinophilia, 1 per cent. only. One of these, a woman of 20 years, showed facial oedema and muscle pains increased by pressure; the other, a woman of 44 years, suffered from debility, shivering and chills, intense lumbar pain, and facial oedema. The incubation period, that is the interval between the time of ingestion and the appearance of the "first symptoms" [the early, irritant symptoms were absent, at all events no mention of them is made], was 15–20 days. All showed fever, but in most slight, and lasting for 5–6 days. There was marked insomnia in the early stages, later equally persistent drowsiness. Attempts were made to obtain embryos in the blood by withdrawing 10 cc. from a vein between the fifth and eighth days of illness. To the blood was added 100 cc. of 3 per cent. acetic acid, and the mixture centrifuged and washed several times with the acetic acid; smears were made of the deposit and stained by Giemsa, but no embryos were found. Treatment by purgation and thymol was tried and for the adults neosalvarsan in an initial dose of 0.15 gm. and increasing with administration at four-day intervals. The milder cases received

only the former and for the muscular pains sodium salicylate. Examination of the local pigs showed a high percentage (6) of infestation.

H. H. S.

ALICATA (Joseph E.). **Infectivity of *Trichinella spiralis* after Successive Feedings to Rabbits.** [Abstract.]—*Jl. Parasitology*. 1935. Dec. Vol. 21. No. 6. p. 431.

"Experiments were performed which involved the passage of non-lethal doses of trichinae every 32 days from two rabbits to two other rabbits until 7 pairs of rabbits were used. The initial strain of larvae was obtained from experimentally infested guinea pigs. The muscles of rabbits receiving the seventh generation of trichinae were heavily infested with larvae. The virulence of the larvae was not diminished as a result of their passage through rabbits seven times in succession, since a guinea pig and a rat fed lethal doses of these larvae died of intestinal trichinosis 4 days after feeding. During the past 7 years the writer has passed a strain of trichinae from guinea pig to guinea pig about once every two months; on 3 or 4 occasions the strain was passed through a rabbit and again transferred to guinea pigs. The above findings are at variance with those of Bachman and Oliver (1934) who found that a strain of trichinae, passed from rabbit to rabbit 20 days after infection, died after the fifth feeding. Bachman and Oliver assumed that the worms lost their virulence and numbers due to successive passages through rabbits. The present writer is of the opinion that Bachman and Oliver did not allow enough time for sufficient larvae to reach the infective stage in the muscles of the rabbits, and that repeated feedings of fewer and fewer infective larvae to successive rabbits gradually reduced the number of infective larvae, the final feeding being entirely negative."

NIÑO (Flavio L.). Triquinosis experimental en la rata. [**Experimental Infestation of Rats with *Trichinella*.**]—*Bol. Inst. Clín. Quirúrg.* Buenos Aires. 1935. Vol. 11. Nos. 97-98-99. pp. 336-350. With 21 figs. & 3 plates. [12 refs.]

The author carried out two sets of experiments. The source of his material was the diaphragm of a pig heavily infested with *Trichinella spiralis*. In the first experiments he fed the animals with the muscle finely divided and mixed with bread and milk and then at intervals killed them and examined the tissues microscopically; in the second another series was fed with part of the same material after it had been 22 days in an ice-chest. Histological details of the findings are described briefly in the text and clearly depicted in photomicrographs. The worm was never found in the lymph tissue of Peyer's patches nor in the lymph glands, but was seen in the gland pits of the mucosa by the fourth day. Many of the rats succumbed within the first week, and showed ulceration and necrosis of the intestinal mucous membrane. At the end of the second week these lesions had practically healed, but the females with packed uteri were seen at the bottom of the glands together with some free embryos; the surrounding tissue contained many eosinophiles. At the same time embryos were found in the heart blood and the striated muscle fibres. This invasion of the muscles appeared to go on for a week or so, the embryos being about 120 μ long by 10-12 μ broad. During the succeeding 10 days they double and may even treble in size and are becoming encysted and

in 25 days after invading the muscles, or 40 from the time of ingestion they are encapsuled. Thereafter the cyst begins to calcify or disintegrate. H. H. S.

McCoy (O. R.). **The Development of Trichinae in Abnormal Environments.**—*Jl. Parasitology*. 1936. Feb. Vol. 22. No. 1. pp. 54–59.

"When sterile larvae of *Trichinella spiralis* were injected into the membranes of living chick embryos or into the amniotic sacs of rat embryos, a small percentage of them developed to the adult stage. The rate of growth in rat embryos was the same as in the normal intestinal environment, but in chick embryos it was somewhat retarded. Development of trichinae also occurred in the lumen of the uteri of pregnant rats, but when larvae were injected into non-pregnant uteri, they were rapidly killed. In a few animals it appeared that normal migration of young trichinae to the muscles of the mother rat took place from female worms which had developed in the uterus. A small series of female rats showing intestinal immunity to a second infection with *Trichinella* larvae given by mouth failed to manifest any significant immunity in the uterus." C. L.

THEILER (Hans) & AUGUSTINE (Donald L.). Zur Frage der immunbiologischen Diagnose der Trichinose. *Zent. f. Bakt.* 1. Abt. Orig. 1935. Nov. 15. Vol. 135. No. 4/5. pp. 299–309. [23 refs.]

O'CONNOR (F. W.) & HULSE (Constance R.). **Studies in Filariasis. I. In Puerto Rico.**—*Puerto Rico Jl. Public Health & Trop. Med.* 1935. Dec. Vol. 11. No. 2. pp. 167–272. With 26 figs. (22 on 16 plates) & 13 charts. [42 refs.] [Spanish version pp. 273–367.]

These studies were put through at intervals during 1929, 1930 and 1931 and their scope covers general as well as local problems.

The worm in question is *Wuchereria bancrofti* and the insect host *Culex fatigans*. The infection is highest in the northern part of the island with its more abundant ground water and greater moisture in the air, and in other places where movement of air is poor. Mosquitoes are bred freely: in barrels used for collecting rain water from roofs, in the swamps which are present round every town and in irrigation ditches within them. Screening of houses is rare, either because it cannot be afforded or because it makes them too hot. On the other hand all persons are completely clothed, only head, hands and ankles being unprotected from mosquitoes. The worst shacks have at most two rooms, overfilled with families of six or more, and there filariasis is abundant, and *C. fatigans* is seen sheltering behind clothing and under beds. Laundresses bring wet clothes into the house, so making an atmosphere suitable for *Culex*. As is seen from cases and histories given, the infection is often one of the family, with infected mosquitoes found in and under the house itself. The biting time of *C. fatigans* is the evening and early part of the night, that is to say, well before the microfilarial wave in the blood is at its height [a fact which may need a readjustment of the ideas regarding the value of periodicity for the survival of the worm species].

The peak of the microfilarial wave is at no really fixed hour. In the same man on two occasions it was reached at 2 a.m. and 4 a.m., and in 3 brothers at 1, 1, and 5 a.m. There is made a close study of the clinical signs, and the conclusion that "each case requires careful individual study, and that the efficacy of therapeutic or surgical measures depends on locating the active center of the disease." Again there is stress on mental sequelae (for deaths from suicide have a high

place) and on economic loss. O'Connor's method for making serial sections on a great scale is clearly put forward, and the pathology is closely described and freely illustrated in a section which will repay detailed study. Differential counts on a large scale have been made, both two-hourly ones in relation to the microfilarial wave in the blood and others made daily, and both show a striking inverse relationship in the numbers of polymorphs to lymphocytes. Filariasis and leprosy often occur together for both are common in the overcrowded dwellings of the poor. These are points which seem the most important to the reviewer, but the report on this very large piece of work must be read itself by those who wish to get the best from it. C. L.

TISSEUIL (J.). Filaire de Bancroft en Guyane: statistique, rôle pathologique. [**Filariasis in Gulana.**]—*Bull. Soc. Path. Exot.* 1936. Jan. 8. Vol. 29. No. 1. pp. 47-49.

A statistical study comes to the conclusion that the presence of filariae, as shown by microfilariae with nocturnal periodicity, has no influence at all on the appearance of elephantiasis or lymphangitis.

Examination of over 300 cases by THÉZÉ & LEGER in 1916 and 1917 gave a microfilarial percentage of just under 28. The author's examination of 241 cases gave a positive percentage of 18.6. He concludes that the incidence is falling. The youngest found infected was a girl of 8. The infection is not familial nor one of the town. Of 20 cases of elephantiasis 5 showed microfilariae and of 15 cases of lymphangitis 3 did. Lymphadenitis is rare. C. L.

SANZ ASTOLFI (J.). La filariosis en el Norte de Marruecos. [**Filariasis in Northern Morocco.**]—*Medicina Países Cálidos.* Madrid. 1936. Jan. Vol. 9. No. 1. pp. 16-25. With 3 figs.

Dr. Gonzalez, an ophthalmologist, sent to the author a worm extracted from the eye of a patient who had come to consult him. This proved to be an adult *Loa loa* and examination of the blood revealed an abundance of embryos. The infestation had been acquired in the French Congo. A short time after the author found embryos of *W. bancrofti*. This patient was a native of Tangier where he had always resided, occasionally paying brief visits to Gibraltar. His father, however, had been to the tropics, and it may be that the son had been infested from the father. Later, a third case, also a *bancrofti* infection, came under the author's observation, a native of Cadiz, who for the last 8 years had lived in the neighbourhood of Morocco, at first in Tetuán, then in Tangier. It is thought (1) that patients become infected by troops returning from the tropics and staying in Gibraltar; (2) that cases are probably more numerous than is generally believed, for the above showed no symptoms clinically indicative of filarial infestation, and (3) that spontaneous cure may occur.

H. H. S.

TEICHLER (G.). *Mikrofilaria bancrofti* in Bauchzyste und Hydrozele. [**Embryos of *W. bancrofti* in an Abdominal Cyst and a Hydrocele.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Jan. Vol. 40. No. 1. pp. 32-34.

A description of 2 cases and a note on the action of drugs on microfilariae *in vitro*.

The first case was one of an abdominal cyst behind the peritoneum evidently lymphatic in nature: volume 3 litres; fluid clear and brownish yellow, s.g. 1.015, containing many characteristic *Mf. bancrofti*. There were none in the blood; but in this there was a secondary anaemia, with eosinophils 12 rising later to 20 per cent. There were no adult worms in the wall of the cyst. There is no mention of any examination for enlarged lymph glands.

The second case is of hydrocele, the only one seen among hill dwellers, though they are common in those living in the plains. It contained many *Mf. bancrofti*.

Microfilariae were killed in a quarter of an hour *in vitro* by 0.001 gm. methylene blue, 0.005 gm. quinine, or 0.005 gm. atabrin per cc. of fluid and within half an hour by 0.006 neosalvarsan, 0.01 tartrate of antimony, 0.001 trypanflavine and 0.02 Tr. iodi. Teichler notes good effects from high doses of quinine in acute inflammatory elephantiasis.

C. L.

KAU (Z. M.). Chronic Filariasis of the Spermatic Cord. Report of Three Cases.—*Chinese Med. Jl.* 1936. Jan. Vol. 50. No. 1. pp. 40–45.

Three cases of chronic filariasis of the spermatic cord are described. It appears that the condition has not before been reported in Chinese literature. The adult worms were found in sections of excised material. A note adds information as to a fourth case. Microfilariae might or might not be present in the blood.

C. L.

IYENGAR (M. O. T.). Entry of *Filaria* Larvae into the Body Cavity of the Mosquito.—*Parasitology.* 1936. Mar. Vol. 28. No. 2. pp. 190–194. With 3 text figs. & 7 figs. on 1 plate.

It is from the cardiac portion of the midgut and in the proventriculus that microfilariae enter the perivisceral cavity of the mosquito.

Iyengar worked with *Culex fatigans* and *Wuchereria bancrofti* and with *Mansonia (Mansonioides) annulifera* and *Filaria malayi*. "When a mosquito sucks blood containing microfilariae the worms that pass up the oesophagus tend to stay in the cardiac portion of the midgut immediately behind the proventriculus." In the narrow lumen the microfilaria holds itself against the current of the blood feed "by forming strong loops against the wall of the gut." It travels forward to the proventriculus where it has been seen within an hour of feeding. "It would appear that the microfilaria penetrates through the wall of the gut near the proventriculus or in the proventriculus itself, and escapes into the perivisceral cavity of the thorax" leaving its sheath behind it. "No worm-larvae were seen in the haemocoel of the abdomen, although they were fairly common in the haemocoel of the thorax. . . . In many instances worms were seen in the perivisceral cavity and in between the muscle bundles within an hour and in a few cases within 20 min. of feeding." It appears that penetration is at an end within 2 hours of feeding. Actual penetration of the wall of the proventriculus was not seen. It is believed that a microfilaria which has come into the "stomach" does not have much chance of entry into the body cavity of the mosquito. Those which do get into the haemocoel of the thorax make their way between

and into muscle fibres. The paper was received for publication on 30th August, 1935 and published on 17th April, 1936.

[Specimens covering much the same ground were shown by O'CONNOR & BEATTY at a Laboratory Meeting of the Royal Society of Tropical Medicine and Hygiene held on 19th March, 1936, and noticed in the *Lancet* on 4th April, 1936. There were marked differences between what was seen in them and the conditions reported by Iyengar. The number of the Society's Transactions in which their descriptions will appear is still in the printer's hands.] C. L.

AUGUSTINE (Donald L.) & DRINKER (Cecil K.). **The Migration of Microfilariae (*Dirofilaria immitis*) from the Blood Vessels to the Lymphatics.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. Nov. 25. Vol. 29. No. 3. pp. 303–306. With 3 figs. on 1 plate.

"1. An experiment is reported in which microfilariae (*Dirofilaria immitis*) have been injected into the circulation of an uninfected dog.

"2. It has been shown in both donor and recipient that microfilariae readily leave the circulation and enter lymphatics. No evidence of a cellular reaction on the part of the host has been found in relation to living microfilariae." C. L.

HINMAN (E. Harold). **Attempted Reversal of Filarial Periodicity in *Dirofilaria immitis*.**—*Proc. Soc. Experim. Biol. & Med.* 1936. Jan. Vol. 33. No. 4. pp. 524–527. With 2 graphs.

In two infected dogs lighting and feeding times were reversed for 11 days. "These results cannot be taken as a true reversal of periodicity, although the daily maximum has been moved forward about 6 hours. However, they do confirm the statement that alteration of daily routine exerts an influence on periodicity." C. L.

DARRIBA (Antonio R.). **Oncocercosis americana. [Onchocerciasis in America.]**—*Medicina Países Cálidos.* Madrid. 1935. Dec. Vol. 8. No. 12. pp. 561–573.

A general review of the subject of onchocerciasis, pointing out that the disease has been known to exist in Guatemala since 1915 when ROBLES first described its presence there and in Mexico since 1923 on the evidence of FÜLLEBORN. As a general article much of it is taken up with an account of the condition in Africa, its symptoms, mode of transmission, diagnosis and treatment. H. H. S.

RODHAIN (J.) & GAVRILOV (W.). Un cas de localisation profonde de "*Microfilaria volvulus*." [**Embryos of *O. volvulus* in the Deeper Tissues.**—*Ann. Soc. Belge de Méd. Trop.* 1935. Dec. 31. Vol. 15. No. 4. pp. 551–560. With 9 figs. on 4 plates. [14 refs.]

Microfilaria volvulus was found in numbers in the connective tissue of certain organs and in blood capillaries.

The material was from the body of a leper woman. Microfilariae were numerous in the connective tissue of the mammary gland, rare in the spleen, rarer still in the kidney, absent in caseous lymph glands about the bronchi and in the mesentery, but present in the connective tissue about the latter, present in the blood capillaries of the liver and in fair numbers in its perilobular connective tissue. They were

as numerous in the connective tissue of the "cubital nerve" as in the mamma. The failure of others to find them in deep connective tissue is noted. C. L.

MÜHLENS (P.). Ein Fall von *Onchocerca volvulus* bei einem Deutschen aus Kamerun.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Jan. Vol. 40. No. 1. pp. 28-32. With 8 figs.

LINDBERG (K.). Remarques sur l'épidémiologie de la draconculose dans l'Inde britannique. Un plaidoyer en faveur de recherches. [**A Plea for Investigation of Dracontiasis in India.**].—*Bull. Soc. Path. Exot.* 1935. Nov. 13. Vol. 28. No. 9. pp. 866-875. [15 refs.]

A report on uncompleted work, its purpose being to put forward points on dracontiasis which are in need of being cleared up.

The work was carried out in the Deccan. Two new cyclops are named but no details of structure are given in this paper, though they will be in another journal. They are *C. multicolor*, whose death takes place after only one guineaworm larva has made its way into it, and *C. vermisfer*, which is, with *C. leuckarti*, a good larval host here. The need for more detailed work is seen when the point is made that in the endemic area there is at least one village where those living there have not even knowledge of the infection and where both these cyclops species are present in numbers. One possible explanation is seen in the experience of another village in which most men had had infection with the worm; in 1932 the steps of the step well were taken away and a wall put up round it, and the village is now free from infection.

LINDBERG (K.). Arthrites suppurées du genou dans la draconculose et arthrites suppurées cryptogénétiques. [**Joint Suppuration associated with Dracontiasis.**].—*Rev. Méd. et Hyg. Trop.* 1935. Sept.-Oct. Vol. 27. No. 5. pp. 215-230.

A report on 12 cases of aseptic suppuration of the knee in regard to which the author's belief is that they were caused by the guinea worm.

This arthritis may make its appearance before the worm does, and inflammation is put down as the probable result of a toxic excretion from it, or it may be a synovial reaction from the worm's nearness, or the worm may discharge larvae into the cavity of the knee. In endemic regions such suppurations are held to be dracontiasis even when no worm is seen, and they occurred in 10 of 30 cases where there was a guineaworm near the knees. C. L.

SAYAD (W. Y.), JOHNSON (V. M.) & FAUST (E. C.). **Human Parasitization with *Gordius robustus*.**—*Jl. Amer. Med. Assoc.* 1936. Feb. 8. Vol. 106. No. 6. pp. 461-462.

A tumour in the eyelid became inflamed and was cut out. In it was a gordiid worm believed to be *Gordius robustus* and to be the first certain case from man. It was small and sexually immature.

C. L.

DELBET (Pierre). Sur la nocivité du pain blanc. [**The Harmfulness of White Bread (in Connexion of Gongylonema and Cancer in Rats).**]—*Bull. Acad. Méd.* 1936. Feb. 11. Vol. 115. No. 6. pp. 267–271.

Before accepting gongylonema as itself able to produce cancer in rats, a connexion worked out by FIBIGER, diet deficiencies in magnesium and vitamin A must be taken into account.

FIBIGER fed his rats on white bread alone, and this diet will itself produce some thickening of squamous epithelium. Gongylonema produces no lesions in rats fed on a good diet; but in those fed on white bread it produces cancer. White bread has little magnesium and little vitamin A. Which of these deficiencies, taken together with gongylonema, is the cause of cancer, is unknown. C. L.

DI AICHELBURG (Ulrico). I fenomeni immunitari nelle elmintiasi. [**Immunity in Helminthiasis.**]—*Giorn. Ital. di Malat. Esot. e Trop.* 1936. Apr. 30. Vol. 9. No. 4. pp. 67–70, 73–5, 77.

A general review of the subject, dealing with natural and acquired immunity, with serum reactions, anaphylaxis and the antigenic properties of worms. There are no new facts brought forward, but the paper is well documented with nearly 200 references. These are referred to by number in the text, but unfortunately are not listed at the end of the paper. A note states that "the bibliography will be published in the extracts," but as it stands the value of the article is much reduced by its absence. H. H. S.

SCHULZ (R. E.) & SCHICHOBALOWA (N.). Immunität bei Wurm-invasionen. [**Immunity in Helminthiasis.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 4. [In Russian pp. 257–280. German summary p. 280.]

A detailed review of the present knowledge regarding immunity in helminthic infections. C. A. Hoare.

LEPROSY.

LEPROSY REVIEW. 1936. Apr. Vol. 7. No. 2. pp. 51-99. With 3 figs. on 2 plates. Quarterly Publication of the British Empire Leprosy Relief Association, 131 Baker Street, London, W.1. [2s.]

The only original paper in this issue is a brief historical note on Leprosy in England with a list of 40 leper houses in Devon and Cornwall in 1307.

J. W. LINDSAY also contributes a translated abstract of the reports of a Brazil Conference on Treatment of Leprosy published in the *Revista de Leprologia de São Paulo*, June 1935. Montel's methylene blue treatment was discussed and very varied conclusions come to, none of the investigators being as enthusiastic as Montel, late toxicity, wasting, and even one fatal accident being reported, in addition to improvement in infiltrated lesions and ulcers and the relief of neuralgias and reactions; the results on the whole were not very encouraging, in spite of the great affinity of the drug for the diseased tissues, but further trials are indicated. Rattlesnake antivenene and osmic acid were advocated in the treatment of leprotic "algias," or reactions. The antivenene was injected subcutaneously twice daily, into or near the painful spot, up to six or eight injections. Osmic acid was injected intravenously in 2 cc. doses of a 2 per mille solution on alternate days up to 5 to 10 doses, and in all of eighteen cases the pains disappeared. The treatment of eye complications was also discussed, but no advance appears to have been recorded. L. Rogers.

BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION. **Worse than Slavery : being the Annual Report for 1935.**—36 pp. With 8 figs. London : 131 Baker Street, W.1.

This report contains a record of useful work throughout the Empire. A new feature of this is the supply of a number of voluntary workers by Toc H, who were trained at the Livingstone College to fit them to assist the medical officers of leper settlements in Nigeria by relieving them of much routine work. The Medical Secretary carried out a tour in the West Indies and British Guiana, reports of which have already been dealt with in this *Bulletin*. L. R.

KEDROWSKY (W. I.). **Modern Aspects of the Epidemiology of Leprosy.**—*Internat. Jl. Leprosy*. Manila. 1935. Oct.-Dec. Vol. 3. No. 4. pp. 443-451.

This is a theoretical paper based largely on the assumption that recent work regarding a virus stage of the tubercle bacillus can safely be applied by analogy to the leprosy organism. The author discusses hereditary transmission but decides against it. He states that MUIR and ROGERS "point to mosquitoes as possible transmitters of leprosy in tropical countries," whereas they only suggested that the dermal lesions produced by biting insects might admit of the entrance of lepra bacilli in those exposed to infection. The author suggests that the infective agent may enter through the nasal mucous membrane without producing local lesions and pass to the lymphatic system, and that the lepra bacillus may make an abrupt mutation outside the body into some resistant form of a hypothetical nature. L. R.

LEPROSY IN INDIA. 1936. Jan. Vol. 8. No. 1. pp. 1-41. With 1 fig. Issued quarterly by the Indian Council of the British Empire Leprosy Relief Association.

Two original articles are included in this number, one being of local interest in recording further notes on the anti-leprosy work in the Salem district of Madras, where 42 clinics treat 3,217 patients every month, about 25 per cent. of the patients attending regularly. The incidence of the disease has been worked out in detail in small areas, and the figure recorded in the clinics was almost twenty times that of the 1931 census. It varied greatly between 0.25 and 9.5 per cent. in different villages, in many of which the spread could be traced, as the disease is generally restricted to members of the same family and to relatives. There is a preponderance of early nerve cases in children, some of which pass into the cutaneous form as they grow up.

In the other paper S. N. CHATTERJI describes the early symptoms of leprosy, as seen in the Calcutta outpatient clinic, much on the usual lines. He also records some cases in which the early signs were associated with injuries, which may either have attracted attention to them or possibly have aggravated the lesions.

L. R.

DEL TORO CANO (Fernando). Nuevos casos de lepra en la zona de Protectorado de España en Marruecos. [**Fresh Cases of Leprosy in Western Morocco.**]*—Medicina Paises Cálidos.* Madrid. 1936. Mar. Vol. 9. No. 3. pp. 125-128. With 2 figs.

Leprosy appears to be increasing in the western part of Morocco, that under Spanish rule. Twenty were recorded in 1934, and another six in the succeeding year. A few details are given of each of these, all were of the nodular type, one with ulceration. Tetuán furnishes the largest number of cases. The places of residence of all are stated; 8 were in Tetuán and 4 each in Jolot and Ceuta.

H. H. S.

HOWARD (A. C.). **Leprosy in Nigeria.***—Internat. Jl. Leprosy.* Manila. 1936. Jan.-Mar. Vol. 4. No. 1. pp. 75-78. With 1 fig. (map).

This brief note describes high leprosy incidence in the densely populated Southern Provinces, with many advanced cutaneous cases complicated by malaria, yaws and ankylostomiasis, a number of whom are dealt with in farm colonies. In the Northern Provinces, among the fatalistic Mohammedans, advanced cases live by begging and resent being sent to a settlement, where advanced disabled cases are mainly seen, but attempts are being made to attract earlier cases.

L. R.

AUSTIN (C. J.). **A Study of Leprosy in Fiji.***—Internat. Jl. Leprosy.* Manila. 1936. Jan.-Mar. Vol. 4. No. 1. pp. 55-70. [13 refs.]

"Leprosy has been in existence in Fiji from a very early date.

"A leprosy station was established by the Government of Fiji on the island of Beqa in 1900, and the present hospital at Makogai was opened in 1911. The number of patients has increased from 40 in 1911 to 427 in 1933.

"Of the 1,365 cases recorded, 54.7 per cent. were neural in type and 45.3 per cent. were cutaneous. Investigation serves to indicate that

there is no such condition as pure cutaneous leprosy without some degree of nerve involvement.

"The sex ratio of the patients was 3.2 : 1, with 76 per cent. males and 24 per cent. females. No evidence appears that sex played any part in determining the type or course of the disease in these patients.

"There have been 417 deaths in the series, of which about 50 per cent. could fairly be attributed to leprosy.

"Of the cases dealt with, 24 per cent. have been conditionally discharged. There were 33 readmissions, of which 8 have been re-discharged to date.

"The most satisfactory improvement occurred in the earlier nerve cases, and it is found that while all types can be improved the prognosis of cutaneous cases as regards cure is comparatively poor." L. R.

MASSAL (E.). La lèpre dans les îles Tuamotou rattachées aux Gambier (îles Reao et Puka-Ruha). [**Leprosy in the Tuamotu Islands (Southern Pacific).**]—*Ann. de Méd. et de Pharm. Colon.* 1935. Oct.-Nov.-Dec. Vol. 33. No. 4. pp. 1023-1038.

The author states that these small French Oceanic islands threaten to become vast leprosaria unless something is done to check the rapid increase of the disease; for on Reao 56 of the 340 inhabitants, and on Puka-Ruha 23 of 180 are already infected. Detailed tables of the types of the cases are given and an isolation centre in the island of Reao is recommended for dealing with the problem. L. R.

DUNHAM (George C.). Leprosy in the Philippine Islands.—*Amer. Jl. Public Health.* 1936. Jan. Vol. 26. No. 1. pp. 27-29.

INTERNATIONAL JOURNAL OF LEPROSY. Manila. 1935. Oct.-Dec. Vol. 3. No. 4. pp. 389-442.—**Report of the Philippine Leprosy Commission presented to the Governor-General September, 1935.**

This is an important report by a Commission appointed by the Governor to advise on leprosy policy in the Philippines, which the Governor has accepted as the basis of future action. The generally recognised facts regarding the slow infectivity of the disease are first emphasized, and isolation with the best available treatment is advised in the case of bacteriologically positive cases, and outpatient clinic treatment for uninfected ones. Home segregation is unsuited to the local conditions, but group segregation not far from the homes of the people is preferred to further extension of the Culion Settlement, which has become too large for convenient administration with its 7,000 cases, and should gradually be reduced. The success of the local treatment centres has resulted in the majority of those isolated having come voluntarily. In the absence of accurate knowledge of the former incidence of leprosy it cannot be shown statistically whether the disease has decreased or not during the twenty-nine years compulsory segregation has been in force, but it is thought to be decreasing because the majority of the new cases, which have remained fairly constantly at 1,000 yearly during the last five years, are early ones. The successful regional treatment stations, which also provide for isolation of infective cases, now number seven with 1,592 patients, and they include a free skin clinic at which early cases are found. They should be provided

with land for cultivation to make them partially self-supporting, and the Manila city Lazar Hospital should be closed and moved to an agricultural area outside the town.

Children of lepers used to be only separated from their parents at the age of two years or more, and attempts to remove them at birth to nurseries proved very fatal to them, so they were only taken away from their mothers at six months of age. It is now advised that arrangements should be made to provide conditions under which they may be reared successfully when removed at birth. About one hundred children are born to lepers yearly at Culion. A subsistence allowance for lepers is advised.

It has not yet proved feasible to follow up many of the 3,500 paroled lepers, but this should be done, in which case release after being six months negative bacteriologically should be allowed, for the confidence that has developed in the results of treatment now permits the released cases as a general rule to be well received by their families. Recent surveys indicate that relapses number nearly 50 per cent. of those discharged, so follow-up treatment is required. These various recommendations should considerably improve the present methods of controlling leprosy in the Philippines. L. R.

RODRIGUEZ (J.), MABALAY (E.) & TOLENTINO (J. G.). A Medical Survey of the Paroled Negatives Living in the Province of Cebu. A Preliminary Report.—*Monthly Bull. Bureau of Health*. Manila. 1935. Nov. Vol. 15. No. 11. pp. 400–409. With 1 fig. [See this *Bulletin*, 1936, Vol. 33, p. 299.]

GIMENO DE SANDE (A.) & FERNANDEZ VALDES (A.). Epidemia de lepra en Andújar. [**Leprosy in Andújar.**].—*Rev. San. e Hig. Pública*. 1936. Jan. Vol. 11. No. 1. pp. 17–34. With 6 figs. [28 refs.]

Andújar is a town in the north-west of the Province of Jaén, in the valley of the Guadalquivir, and has a population of 23,559. According to MONTANÉS, there were in 1934 some 928 lepers in Spain of whom 315 were in Andújar with Badajoz and at Jaén 59. In Andújar itself 39 cases are known, *i.e.*, 1.6 per 1,000 population. Twenty-eight have been studied in detail; one was under 15 years, two between 15 and 20, eleven between 20 and 40, twelve between 40 and 60 and two over 60 years. Direct contact is the chief, perhaps the only, source in the town; it was proved in two-thirds of the cases and in over half husband or wife contracted it from the other. Of 22 examined bacteriologically the nasal mucus was positive in 20, thick drop in 19 and exudation from skin lesions in 6. [These figures, however, convey but little information as the type of disease is not stated.] H. H. S.

DE ALBUQUERQUE (A. F. Rodrigues). Analyse epidemiologica de 1110 fichas de leprosos da colonia "Santa Izabel," Minas Geraes. [**Analysis of 1110 Cases of Leprosy at the Santa Izabel Colony, Minas Geraes.**].—*Brasil-Medico*. 1935. Dec. 7. Vol. 49. No. 49. pp. 1094–1099. [18 refs.]

This is a careful analysis from the aspects of age, sex, occupation, locality of origin, type and stage of disease, etc. Of the 1,110 patients interned at the Colony males were more than twice as many as females, 2.2 to 1. More than two-fifths, 41.9 per cent., acquired the infection

between the ages of 21 and 35 years. Half the patients were labourers in the fields and 26.5 per cent. were domestic workers. "This fact observed throughout Brazil gives leprosy the character among us of a disease chiefly rural." Nine hundred and fifty-four, or 85.9 per cent. of the total were examined bacteriologically, and 804 or 78.2 per cent. of these were positive. In nearly half, 47.4 per cent., a history of leprous parents was obtained and the probability is that in a large proportion infection was acquired at the homes. *H. H. S.*

KNOTT (James). Compulsory Segregation of Leprosy. Twenty-Five Years Trial in Saint Croix.—*Internat. Jl. Leprosy.* Manila. 1936. Jan.-Mar. Vol. 4. No. 1. pp. 71-74.

The author records that twenty-five years' trial of compulsory segregation on the small West Indian Island of Saint Croix, with a population of 14,423 and a leprosy incidence of 7.87 per mille, has not resulted in any appreciable reduction in the disease. On the recommendation of the Danish leprologist, EHLERS, a village colony was constructed for the 87 positive cases of leprosy, since which all known cases have been kept isolated, unless released on parole, yet since 1918, 88 new cases have been admitted and there are now more known cases than 25 or even 57 years ago. The conditions on the island are not unfavourable and the economic status of the people is fairly good; the people are friendly and they report cases, and all school children are examined yearly. These disappointing results are attributed to the cases not being found early enough. It does not appear that the house contacts of all known cases are frequently examined to enable early cases to be discovered. *L. R.*

RICHARDSON (R. C.). Experience with Children of Lepers; at the Miraj Home for Untainted Children.—*Internat. Jl. Leprosy.* Manila. 1936. Jan.-Mar. Vol. 4. No. 1. pp. 49-53.

This is an interesting record of the results of caring for the untainted children of lepers in the Miraj home of the Mission to Lepers in India, which was opened in 1919 and has since admitted 46 children aged from fifteen days to twelve years. Five died from various conditions during their first year of life, and of the remaining 41 only four developed any signs of leprosy, two becoming cured and the other two improved under treatment, and none passed into an infective stage; so their isolation from their infected parents has proved very successful. *L. R.*

EUBANAS (Froilan). The Public Health Aspect of the Parole of Negative Lepers.—*Monthly Bull. Bureau of Health.* Manila. 1935. Feb. Vol. 15. No. 2. pp. 57-65. [12 refs.]

The author raises the question of the possible danger of infection from the large numbers of lepers released as negative bacteriologically in the Philippines on account of some of them relapsing into an infective stage, and suggests that the present period of six months negative before release should be raised again to one year. On the other hand, he recognizes the value of releasing recovering cases in encouraging other early ones to come forward voluntarily for treatment. He quotes data from papers that have been reviewed in previous issues of this *Bulletin*

regarding the difficulty in following up the released cases and the frequency of relapses among them, and he is in agreement with the recent Commission's recommendation that an efficient follow-up and treatment agency should be provided.

L. R.

LIE (H. P.). **The Classification of Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1936. Jan.–Mar. Vol. 4. No. 1. pp. 35–44. [10 refs.]

The author considers the classification of leprosy cases adopted by the Manila Conference of 1934 to be a praiseworthy effort, and one that requires amplification. After giving a brief history of the nomenclature of the Norwegian authorities of last century, he suggests the introduction of the addition symbol M to represent the maculo-anesthetic lesions of HANSEN and LOOFT; as, although a few bacilli can be demonstrated by examination of a number of serial sections, they differ from the macules containing numerous lepra bacilli represented in the present nomenclature by the letter N, so that a mixed case might be designated N₃M. He also thinks the use of the letter C for cutaneous may cause confusion and that T to signify "tuber" or nodule is preferable, and a small "t" should be used for "tuberculoid leprosy." The presence or absence of lepra bacilli might also be indicated by B+ or B—. By these various means lesions could be indicated simply by such formulas as NMtB+ or NMtB— for example, in place of long verbal descriptions.

L. R.

TISSEUIL (J.). Essai de classification des tuberculoides de la lèpre. [**Classification of Tuberculoid Leprosy.**]—*Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 238–242.

The author has studied 200 cases of tuberculoid leprosy in the French Loyalty Islands and proposes the following classification, which may have to be amended by further experience. He has already described primary, secondary, intermediary and "medallion" stages of the lesions; and he now adds as varieties "tuberculoides en aires," "rose-jaunâtre," "parakératosiques," "granitées," "en plateau," "rosées," "rouges" and "brillantes."

L. R.

GERMOND (R. C.). **The Modern International Type Classification of Leprosy.**—*South African Med. Jl.* 1936. Jan. 11. Vol. 10. No. 1. pp. 17–25.

This is a description of the Manila Conference classification, with definitions of the terms, which will be useful to those not already acquainted with it.

L. R.

MUIR (E.). **Juvenile Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1936. Jan.–Mar. Vol. 4. No. 1. pp. 45–48.

Under this term the author gives a brief description of cases of leprosy occurring in young children with little resistance to the bacillus when coming into contact with a highly infectious case. It is characterized by the absence of typical clinical symptoms apart from ill-defined macules, keratosis, hypopigmentation in dark skins or erythema in fair ones. The macules vary in appearance from time to time and contain few bacilli, so are difficult to recognize if a bacteriological examination

proves negative. It may be seen as early as in three months old children and is rare after puberty. A negative leprolin test in a child may lead to its detection. The maintenance of the general health and a few hydnocarpus injections are indicated. L. R.

CHIYUTO (Sulpicio). Early Leprotic Changes in Children and their Bearing on the Transmission and Evolution of the Disease, II.—*Monthly Bull. Bureau of Health*. Manila. 1934. Dec. Vol. 14. No. 12. pp. 363-396. [18 refs.]

LARA & DE VERA. Clinical Observations with Reference to Leprosy in Children of Lepers.—*Monthly Bull. Bureau of Health*. Manila. 1935. Jan. Vol. 15. No. 1. pp. 17-41. [See also this *Bulletin*, 1932, Vol. 29, p. 543.]

RODRIGUEZ (J.) & PLANTILLA (F. C.). **Observations on the Progress of Incipient Lesions of Leprosy.**—*Internat. Jl. Leprosy*. Manila. 1935. Oct.-Dec. Vol. 3. No. 4. pp. 453-465. With 1 fig.

The authors report further observations on repeated examinations of the earliest lesions among 336 children of lepers, whom they have now followed up for seven years after they had been removed from their parents at various ages. Transfer when of two years of age diminished greatly the number who became positive, although MANALANG and CHIYUTO found on most of them skin lesions that they believed to be early manifestations of leprosy and regard them as "frustrated cases," although many of these lesions must be considered doubtful in nature. Another group of 225 "closed" cases, with definite, but bacteriologically negative dermal lesions, have been studied for from seven months to four years, with an average of about two years, and 31, or 13.8 per cent., have become bacteriologically positive, distributed equally between the two sexes. The red macule is most likely to become positive, and a sudden change in an area of anaesthesia independent of macules was also of ominous import. Positive cases were significantly less among those regularly than in those irregularly treated, although in some even prolonged treatment did not prevent their becoming positive. L. R.

PLANTILLA (Fidel C.). **Observations on Leprosy at the Cebu Skin Dispensary.**—*Monthly Bull. Bureau of Health*. Manila. 1935. Jan. Vol. 15. No. 1. pp. 3-16.

Work at out-patient skin clinics has led to the discovery of many early cases of leprosy, although many still come late. Relapses among paroled cases have also been discovered. Recently examination of 577 house and other contacts revealed 21.3 per cent. with suspicious, and 3.2 per cent. with definite, leprosy lesions; all the latter showed anaesthesia or lepra bacilli. In women the figure was 3.7 against 2.8 in men, none of the latter being over 25 years of age. The suspicious lesions are very difficult to differentiate from common skin lesions, but it is hoped by following them up to be able to establish which are leprotic and which are not. In 1932 the examination of school children in badly infected areas revealed among 13,586, 2.6 per mille of infections, but this is a very low figure compared with 3.2 per cent. among contacts. The most common lesions are pale pinkish areas and infiltrations. L. R.

PARDO-CASTELLO (V.) Leprosy associated with Dermatitis Atrophicans Diffusa et Progressiva.—*Arch. Dermat. & Syph.* 1936. Jan. Vol. 33. No. 1. pp. 12–20. With 6 figs.

SCHUJMAN (Salomon). Coexistencia de abceso nervioso y lepra tuberculoides (algunas consideraciones sobre la patogenia destes dos procesos). [**Nerve Abscess and Tuberculoid Leprosy.**]*—Rev. Leprologia de São Paulo.* 1935. Dec. Vol. 2. No. 4. pp. 277–289. With 6 figs. [11 refs.] English summary (8 lines).

Three cases are described in which an abscess appeared in the course of a thickened nerve, in two on the arm, in the third on the chin and neck and on the left gluteal region. In each case purulent, broken down material was obtained on incision, containing in one case (the third) a few bacilli, in the others none. The author concludes:—

“The neural leprous abscess is the tuberculoid leprosy of the nerve, or still better, the tuberculoid granuloma of the nerve in open reaction, similar to the reactions observed in the tuberculoid lesions of the skin.” Both the leprous abscess and the lepra reaction of tuberculoid leprosy are to be regarded as allergic phenomena (tanto el abceso leproso como la reacción leproso tuberculoides podrían interpretarse como fenómenos alérgicos).
H. H. S.

ESSER (P. H.). Psychoses bij lepra. [**Psychoses in Leprosy.**]*—Geneesk. Tijdschr. v. Nederl.-Indië.* 1936. Feb. 25. Vol. 76. No. 8. pp. 463–480. [39 refs.]

This paper is almost identical with that already abstracted. [*Ante*, p. 300.]
H. H. S.

TOLENTINO (Jose G.). Leprosy of the Palms and Soles.—*Monthly Bull. Bureau of Health.* Manila. 1934. Sept. Vol. 14. No. 9. pp. 281–287.

COWDRY (E. V.), HEIMBURGER (L. F.) & WILLIAMS (P. S.). **A Spectrographic Study of Leprous Lesions.**—*Amer. Jl. Path.* 1936. Jan. Vol. 12. No. 1. pp. 13–29. With 2 plates & 1 graph. [12 refs.]

This is a highly technical paper from which it is concluded that the ratios of P to Ca in five leprous lesions was on the average probably three times those in normal skins, but the Na-Ca, Mg-Ca and Fe-Ca ratios showed no notable variations from the normal.
L. R.

LIE (H. P.). **Demonstration of the Leprosy Bacillus in the Leprides.**—*Internat. Jl. Leprosy.* Manila. 1935. Oct.–Dec. Vol. 3. No. 4. pp. 473–476.

The author refers to the difficulty in demonstrating lepra bacilli in the ordinary spots of macular leprosy, but has found that with proper technique and sufficient patience he has always been able to demonstrate them, and he thinks that scarcely anyone can doubt that these lesions are due to the presence of the bacilli as long as the process is an active one.

He has now extended his observations to histological examinations of series of sections of the lesions of ten tuberculoid cases sent to him from South Africa, and succeeded in demonstrating a few scattered and often isolated lepra bacilli by the technique he describes in detail, and which should be referred to by all interested.
L. R.

POOMAN (A.). Eine einfache Methode zur Färbung von Lepraerreger und Tuberkelbazillen.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Mar. Vol. 40. No. 3. pp. 112-114. With 1 fig.

LEFROU (G.). La valeur de l'examen du mucus nasal et des biopsies cutanées comme procédés de diagnostic bactérioscopique de la lèpre. [**Examination of Mucus and Sections for Lepa Bacilli.**]—*Bull. Soc. Path. Exot.* 1935. Dec. 11. Vol. 28. No. 10. pp. 889-893.

The author reports his experience of the relative value of the examination of nasal mucus and of sections of leprous tissues respectively in the diagnosis of leprosy. The results are clearly shown in the different forms and stages of the disease in Table I. This brings out the infrequency of nasal infection in the early macular form of leprosy and in nerve cases. Moreover, in the first year of the disease the nasal mucus was only positive in 3.6 per cent., but sections of the tissues revealed the bacillus in 30 per cent. of the cases, and after the first year the nasal mucus was positive in 25 per cent. and sections in an additional 15 per cent., or a total of 40 per cent. He has not found the administration of potassium iodide to increase the number of positive results from the nasal mucus.

Result of the Examinations following the Form of the Disease

Number of Cases	Clinical Form	Nasal Mucus +	Biopsy +	Total +	Nasal Mucus Percentage +	Biopsy Percentage +	Total Percentage +
130	Macular	2	22	24	1.5	16.9	18.2
35	Papular	11	19	30	31.4	54.2	85.7
21	Tubercular	19	2	21	90.4	9.5	100.0
24	Nervous	3	1	4	12.5	4.1	16.6
210		35	44	79	16.6	20.9	37.6

L. R.

PIETER. Une nouvelle méthode de démonstration du bacille d'Hansen dans quelques lésions non ouvertes de la peau. [**New Method of demonstrating Hansen's Bacillus.**]—*Rev. Méd. et Hyg. Trop.* 1935. Sept.-Oct. Vol. 27. No. 5. pp. 233-234.

The skin over a lesion should be cleaned with ether and acetone, scarified as for von Pirquet's reaction, a small cup applied and the drop of serum thus obtained on a slide stained with eosine and methylene blue, each 10 cgm., by Wright's method.

L. R.

LEFROU (G.). & DES ESSARTS (J. Quérangal). Biopsies cutanées et histodiagnostic de la lèpre. [**Diagnosis of Leprosy by Biopsy Examination of the Skin.**]—*Bull. Soc. Path. Exot.* 1936. Feb. 12. Vol. 29. No. 2. pp. 186-193.

The authors have shown by examinations of the nasal mucus and of small portions of the affected skin that leprosy bacilli can be found in 40 per cent. of cases, and they have inquired if this number can be increased by histological examinations. They report that in 175 cases

simple smears showed the bacilli 44 times, but by close examination of histological sections they found very scanty bacilli in 6 additional cases. They also discuss the tissue changes met with, and find that they are similar to those produced by other granulomatous diseases, such as tuberculosis, syphilis, lymphogranuloma and certain mycoses.

L. R.

FERNANDEZ (Jose M. M.). Bacteriologia de la reacción leprosa. Investigación del *Mycobacterium leprae* en las lesiones cutaneas de reacción leprosa. [**Study of *Myco. leprae* in the Cutaneous Lesions of the Lepa Reaction.**].—*Rev. Brasileira Leprologia*. S. Paulo. 1936. Mar. Vol. 4. No. 1. pp. 9-26. With 3 figs. English summary.

The author examined 24 cases of lepra reaction, making a small incision with a scarifier and scraping the edge to obtain serum, spreading the product on a slide, fixing and staining in the usual way. This was done on pre-existing nodules or maculae, on parts apparently healthy at the time of the reaction, and during its regression and in areas round the reacting foci.

In the actual cutaneous lesions of the reaction, at the time and during retrogression, the bacilli were seen in the granular form, sometimes, but not always, with the bacillary form; the granular predominated according to the intensity of the local reaction. The acute period is marked by the degree of polymorphism of the bacillus and by aggregation of them. The skin adjacent to the reacting lesions was always positive, showing the granular forms, whereas apparently normal skin at a distance was nearly always negative. Nodules, macules, and infiltrations though not appearing to join in the reaction often showed abundant granular forms, especially if the reaction was severe. In lepromata at a distance from the site of reaction the organisms were in the usual form of globi of entire bacilli.

H. H. S.

MANALANG (C.). Pathologic and Bacteriologic Survey of Lepers (Post Mortem). II.—*Monthly Bull. Bureau of Health*. Manila. 1934. Nov. Vol. 14. No. 11. pp. 335-340. [11 refs.]

MANALANG (C.). Pathologic and Bacteriologic Survey of Lepers (Post Mortem). IV.—*Monthly Bull. Bureau of Health*. Manila. 1935. Oct. Vol. 15. No. 10. pp. 361-364.

Post-mortem histological examinations have been made of areas of apparently normal plantar surfaces of the feet of 16 Culion lepers and histological abnormalities found in 94 per cent. and the *M. leprae* in 87.5 per cent. The author therefore thinks that drug infiltration should include the plantar and palmar surfaces, and multiple smears of these areas should be made before parole, and that the infection of the nerves in leprosy is probably always from the periphery.

L. R.

MANALANG (C.). Pathologic and Bacteriologic Survey of Lepers (Post Mortem). V.—*Monthly Bull. Bureau of Health*. Manila. 1935. Nov. Vol. 15. No. 11. pp. 391-399. [14 refs.]

In this note the author reports on post-mortem microscopic examinations of the apparently healthy skin of some of the areas believed to be relatively immune to leprosy lesions, including the clinically normal

posterior inferior auricular and inguinal regions. In 40 cases examined 16, or 40 per cent., of the auricular regions showed lepra bacilli, which he thinks are derived from the neighbouring lobes of the ears, for the organisms were only found in 4 per cent. in the inguinal region situated further from active lesions. L. R.

BECHELLI (Luiz Marino). Considerações sobre alguns casos de esplenomegalias na lepra. [**Splenomegaly in Leprosy.**—*Rev. Leprologia de São Paulo*. 1935. Dec. Vol. 2. No. 4. pp. 213-275. With 16 text figs. & 3 coloured figs. on 1 plate. [52 refs.] English summary.

This article is in three parts; the first gives details of the physical condition and the results of laboratory investigation of 11 cases of leprosy; the second treats of the pathological anatomy of the spleen in leprosy. Eight of the 11 gave a positive Wassermann reaction (1-4 plus), one gave a 4 plus Kahn, but negative W.R., in two the serum test is not mentioned. The illustrations in the pathological part of the paper are excellent. The third part considers the differential diagnosis of the causes of splenic enlargement as presented in his cases. He notes that splenomegaly occurred only in nodular and mixed forms, that it was rarely accompanied by pain, and concludes that although examination of material obtained by spleen puncture did not reveal lepra bacilli, nevertheless leprosy itself can cause this enlargement. H. H. S.

CAMPOS (Nelson de Souza). Tuméfaction caséuse des nerfs au cours de la lèpre. Étude des névrites nodulaires caséifiées de structure tuberculoïde. [**Caseous Swelling of Nerves.**—*Internat. Jl. Leprosy*. Manila. 1936. Jan.-Mar. Vol. 4. No. 1. pp. 1-24. With 26 figs. on 6 plates. [11 refs.]

The author gives a detailed illustrated description of fifteen cases of nodular thickening of the nerves with caseation, and regards the condition as a mild tuberculoid form of the disease with a high degree of immunity. L. R.

TAKINO (Masuichi) & MIYAKE (Shozo). Die Veränderung der vegetativen Nerven bei der Lepra, besonders bei der infiltrativen Form. [**Nerve Changes in Leprosy.**—*Acta Scholae Med. Univ. Imperialis in Kioto*. 1935. Vol. 18. No. 2. pp. 85-115. With 5 figs. & 4 plates (1 coloured). [21 refs.]

This is a well illustrated account of the histology of leprotic lesions with descriptions of the formation of globi containing numerous bacilli and the distribution of the organisms in the nerves. L. R.

MUIR (Ernest). **Cellular Reaction to *Bacillus leprae*.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Feb. 29. Vol. 29. No. 5. pp. 547-552. With 8 figs. on 4 plates.

The author summarizes his views on this question with histological illustrations. The symptoms of leprosy are caused by local cellular reactions to the bacillus of very varying types in response to the multiplication of the organisms in the intercellular lymph spaces and cells of the skin and nerves. If the response is weak cell-division is

sluggish and ingestion feeble, with the result that the bacilli become very numerous in vacuolated cells. If the response is strong the lymphoid and endothelial cells multiply greatly and even giant cells form, but very few bacilli are present, as in the tuberculoid type of lesion and abscesses may form in the nerve trunks. In young children the response is weak with little cellular reaction and positive leprolin reactions. The bacilli may accumulate in the nerves, which may be a reason for the difficulty in completely destroying the organisms.

L. R.

NOLASCO (J. O.). Calcification and Osteoid Changes in the Nerve in Leprosy. Report of a Case.—*Internat. Jl. Leprosy*. Manila. 1936. Jan.-Mar. Vol. 4. No. 1. pp. 25-28. With 3 figs. on 1 plate.

TAJIRI (Isamu). **Leprotic Changes in the Lung.**—*Internat. Jl. Leprosy*. Manila. 1935. Oct.-Dec. Vol. 3. No. 4. pp. 467-470. With 4 figs. on 1 plate.

The author reports on the microscopical examination of the lungs post-mortem in five cases in which tuberculous infection could be excluded. He found no naked eye lesions, but in sections small lepromata were detected in the alveolar septa due to the bacilli of nodular cases reaching the organ through the blood stream. In the macular and neural cases leprotic changes never occur in the lung except in nerves.

L. R.

LAGOUDAKY (Socrates). **Preliminary Note on Self-Inoculation of Leprosy.**—*Jl. Trop. Med. & Hyg.* 1936. Apr. 1. Vol. 39. No. 7. pp. 81-83.

This is a remarkable account of the intravenous inoculation of the author on three occasions with 3 gr. [*sic.* ? cc.] of blood from a Greek leper twice and a native leper once. A month later he began to get pain in one foot, ten days later two small subcutaneous lepromas appeared on his hands and other lesions during the following month, including anaesthetic spots. He states that lepromas are forerunners of the disease in which microbes are found, and writes of the "ultravirus." He does not clearly say whether bacilli were found in his lesions, but mentions that they cleared up under intradermal treatment begun five months after the first inoculation on June 9th 1934. His colleagues apparently agreed with the diagnosis of early leprosy.

L. R.

SHIGA (K.). **Studies concerning the Leprabacillus. 2nd Communication: Intracerebral Infection with Leprabacilli.**—*Kitasato Arch. Experim. Med.* 1936. Jan. Vol. 13. No. 1. pp. 1-8. With 3 coloured figs. on 1 plate.

The author reports on his numerous animal experiments. He first refers to his previous paper of 1929 [this *Bulletin*, 1930, Vol. 27, p. 339] on the culture of the lepra bacillus, and states that he never succeeded in getting beyond the "microscopic colonies" he had then obtained. He then refers to five years' work at the inoculation of animals with the organism, for which he found mice the most suitable, and mentions that the bacilli lived longer in those fed on diets deficient in vitamins, but removal of certain organs or the use of various drugs and chemicals

failed to increase the susceptibility of his animals, and all the results were negative with the exception of the following. In the course of intracerebral inoculations of over one thousand mice he several times found a large number of lepra bacilli post-mortem, and in one instance the brain, liver and spleen showed distinct leprosy changes, with bacilli in the walls of the capillary vessels and reticulo-endothelial cells of the brain, and extensive formation in the liver and spleen of granulomas containing enormous numbers of acid-fast bacilli as shown by coloured illustrations. He thinks these were actually caused by the lepra bacilli, but considers that further investigations on these lines are required. L. R.

WATANABE (Yoshimasa). **Experimental Studies on Animals concerning Leprosy. Report V. Experiments on Inheritance of Predisposition for Leprosy of Rat.**—*Kitasato Arch. Experim. Med.* 1936. Jan. Vol. 13. No. 1. pp. 66–69.

The author records breeding from rats infected with rat leprosy, and then testing if their offspring were more susceptible to inoculation with the acid-fast bacillus of the disease than those of healthy rats. The results were negative, so he concludes that the young of infected rats are not predisposed to the disease. He mentions that infected rats can infect healthy ones by biting them, and thinks this to be the natural mode of infection. L. R.

PRUDHOMME (R. O.). Le glutathion réduit dans la lèpre murine. [**Reduction of Glutathion in Rat Leprosy.**]—*C. R. Soc. Biol.* 1936. Vol. 121. No. 12. pp. 1167–1169.

At the suggestion of M. Marchoux the author has examined to ascertain if the reduction in the amount of glutathion in the tissues of tuberculous patients is also present in the case of rat leprosy. He concludes that this substance is not much reduced in the livers and spleens of infected rats unless these organs are seriously involved in the disease, when there is a considerable fall. L. R.

GAVRILOV (W.) & DUBOIS (A.). Culture du bacille de Stephansky. [**Cultivation of the Bacillus of Rat Leprosy.**]—*C. R. Soc. Biol.* 1936. Vol. 121. No. 13. pp. 1384–1386.

This brief paper records that the acid-fast bacillus of rat leprosy was cultivated from lesions of the disease on culture media found suitable for the tubercle bacillus such as glycerine agar, Denys' egg medium, potato and Loewenstein's medium, with the substitution of rat serum for human serum. Small colonies appeared after two months and were subcultured successfully up to the third passage. L. R.

BIER (Otto G.). Ueber die Serologie der Lepra. V. Die Phenolausflockung unter hypotonischen Bedingungen als Labilitätsäusserung des Lepraserums. [**The Serology of Leprosy. V. Phenol Precipitation of Leper Serum under Certain Conditions.**]—*Arch. f. Schiffs- u. Trop. Hyg.* 1936. Jan. Vol. 40. No. 1. pp. 25–28.

The author has tested the diagnostic value in leprosy of Von Binni and De Blasio's hypotonic phenol precipitation method. They

conclude that the tuberculosis test gave 70 per cent. of positive reactions in nodular and 30 per cent. in nerve leprosy, and the syphilitic test gave 44 per cent. positive in nodular and 30 per cent. in nerve cases of leprosy. L. R.

VILLELA (Gilberto G.) & CASTRO (Almir). Estudos sobre a biochimica da lepra. I. Cholesterol e esterios de cholesterol no plasma.—*Brasil-Medico*. 1936. Jan. 4. Vol. 50. No. 1. pp. 1-2. With 2 charts.

JORDAN (Paul). Uebertragung der Lepra des Menschen auf Zuchtratten mit der Möglichkeit zum Weiterimpfen und auch als fortschreitende Krankheit. [**Inoculation of Rats with Human Leprosy.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Mar. Vol. 40. No. 3. pp. 92-112. With 9 figs. [29 refs.]

The author deals with the question of the possibility of inoculating bred rats with human leprosy. He concludes that the numerous attempts to do so have twice resulted in producing tumours in the skin of the animals by this means with an incubation period of $1\frac{1}{4}$ to $1\frac{1}{2}$ years. A second passage led to the evolution of the disease to affect the internal organs. L. R.

MOCHTAR (A.) & SARDJITO (M.). Gejodeerde chaulmoogras aethylicus in de therapie der lepra. [**Iodized Chaulmoogra Ethylate in the Treatment of Leprosy.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1936. Apr. 21. Vol. 76. No. 16. pp. 973-983. With 8 figs. on 2 plates. [10 refs.]

The iodized ethylate of chaulmoogra is the ethyl ester with addition of 0.5 per cent. iodine. It has been used in the treatment of leprosy since about 1920. The addition of the iodine has served to limit the local irritation effect of intramuscular injection and also some of the general symptoms, such as giddiness, fever, headaches and rheumatic pains. Iodine, moreover, is disinfectant and may itself contribute something in the treatment of leprosy. Comparative trials were instituted between the efficacy of alepol, chaulmoogra oil and the ethyl ester, in which the last of these appeared to be the most efficacious, but the numbers under test were very small. Of 43 patients treated with iodized ethylate in 1934 at the polyclinic 23 showed improvement, 17 remained stationary and 4 were worse. Not only is this medication usable in polyclinic and hospital but is, because of the smallness of the dosage and the slight reaction, specially suitable for large-scale country district operations. Such operations also have the great advantage of being less costly than institutional treatment. These seem to be arguments which justify extended trial of the ethylate of chaulmoogra in leprosy. W. F. Harvey.

ROY (A. T.) & RAO (G. R.). **Fluorescein in Lepra Reaction.**—*Indian Med. Gaz.* 1936. Jan. Vol. 71. No. 1. pp. 25-28. With 4 charts.

The authors having previously reported beneficial effects in prolonged lepra reactions from the use of "mercurochrome-220 soluble," a fluorescein compound of mercury, they have tested the value of fluorescein itself, in view of its recommendation by RYRIE, at the Purulia Leper Colony with 800 inmates and 2,000 outpatient attendances monthly. As the term lepra-reaction has been applied to anything from periodic pains through brief febrile self-clearing reactions to severe

prolonged ones, they have confined their tests to prolonged severe febrile rises of over seven days duration, with the exacerbation of old and the appearance of new lesions, and all the twelve cases dealt with were under close observation in hospital. Nine were treated with fluorescein in doses of 10 cc. of a two per cent. freshly prepared solution of Grubler's water-soluble preparation two to three times a week, and records were kept of the erythrocyte sedimentation index and the temperature. Three control cases were treated respectively with potassium antimony tartrate, physiological saline and no special treatment. They conclude that, although two to four injections of fluorescein have an undoubted antipyretic effect, no beneficial effect was obtained on the sedimentation index or in decreasing the debility, and similar falls of temperature occurred in the controls. The drug may be of some value as an alternative to the antimony preparation.

L. R.

DOROLLE (P.), NGO-QUANG-LY, HUYNH-VAN-HUY & TRAN-VAN-TAM. Bleu de méthylène et bleu de méthylène-éosine dans le traitement de la lèpre. Étude de la toxicité expérimentale et résultats cliniques obtenus. [**Methylene Blue Alone and with Eosine in the Treatment of Leprosy.**—*Bull. Soc. Path. Exot.* 1935. Nov. 13. Vol. 28. No. 9. pp. 839-849. [10 refs.]

This paper brings up the number of cases previously reported on [*ante*, p. 309] from 30 to 55, and comes to the same conclusions regarding the value of the treatment, especially when combined with chaulmoogra preparations.

L. R.

SOUZA-ARAÚJO (H. C.). **Treatment of Leprosy by Methylene Blue.**—*Internat. Jl. Leprosy.* Manila. 1935. Oct.-Dec. Vol. 3. No. 4. pp. 471-473. [11 refs.]

The author points out that the methylene blue treatment of leprosy was first used by Miguel COUTO and Mario RANGEL in 1927 in Rio de Janeiro, long before MONTEL, and they obtained the tattooing of the lesions, but only slight temporary improvement, and concluded from a study of ten cases that absolutely no therapeutical result was obtained.

L. R.

- i. MONTEL (R.) & LE-VAN-PHUNG. Un cas de lèpre tuberculeuse généralisée Blanchi cliniquement et bactériologiquement en 10 mois. Traitement mixte par le bleu de méthylène et le chaulmoogra. [**Methylene Blue and Chaulmoogra in Leprosy.**—*Bull. Soc. Path. Exot.* 1936. Jan. 8. Vol. 29. No. 1. pp. 23-28.
- ii. LÉPINE (P.) & MARKIANOS (J.). Résultats obtenus dans le traitement de la lèpre par le bleu de méthylène. [**The Treatment of Leprosy by Methylene Blue.**—*Ibid.* pp. 28-30.
- iii. BERNY (P.). Action du bleu de méthylène administré par voie buccale sur les douleurs des lépreux. [**Methylene Blue by Mouth in the Treatment of the Pains of Leprosy.**—*Ibid.* pp. 30-33. [14 refs.]

i. This is an account of a single nodular case of leprosy of three years' duration, whose symptoms cleared up, with the exception of some remaining nerve thickening and loss of sensation, after 10 month's treatment, including 72 injections of methylene blue, 5 of "carbone

porphyriser" of St. Jaques, 52 of collobiase de chaulmoogra and 13 of Merchado's chaulmoogra mixture.

ii. These workers report a trial of the methylene blue treatment, uncomplicated by the use of other drugs, continued up to 14 months in some cases, following rigorously Montel's method. The first results were encouraging with softening and reduction of nodules by ulceration, and decline of the temperature in febrile cases. Unfortunately the benefit was very limited, as the general course of the disease was not influenced, and some of the patients after a time declined to continue the treatment. They then tried it in early cases with limited cutaneous lesions, but no improvement resulted. In nerve forms and mixed ones no appreciable benefit resulted from prolonged trials. They confirm the tendency of the lepra bacilli to lose their acid-fast characters under the treatment. Although they have obtained no certain improvement in the general condition of their patients, or any profound modification in the course of the disease, they are continuing their trials of the drug.

iii. A trial of methylene blue orally in pill form up to 30 cgm. daily resulted in a rapid reduction in the pains of leprosy patients with relief of considerable duration. L. R.

VALLE (Sergio). Prophylaxia da cegueira na lepra. [**Prevention of Blindness in Leprosy.**].—*Brasil-Medico*. 1936. Mar. 28. Vol. 50. No. 13. pp. 265-275. With 3 figs.

The insidious march of leprosy, its chronicity in evolution, may lead to blindness in spite of every care and precaution. If the posterior segment of the eye is not involved there may be perception of light for a long time, in fact until the globe atrophies or swells to a staphyloma. According to the author infection enters anteriorly by way of the anterior ciliary arteries through anastomoses with the posterior vessels of the conjunctiva, extending thither from the supraciliary, or palpebral region or neighbouring site. Thus is explained the predilection for the anterior segment and early localization between the recti tendons and the cornea. For prophylactic purposes the author employs perilimbic cautery, peritomy, removal of tubercles followed by cautery of the surface. For active lesions he is in favour of copper salts. In acute crises with severe and persisting pain he finds trypan blue, given by the method of Muir and Chatterji, quite satisfactory. He recommends dark glasses to avoid the dazzle in cases of rupture of the iris, to reduce photophobia and protect the insensitive cornea from dust and wind. H. H. S.

NOCHT (B.). Fieberbehandlung bei Lepra.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Jan. Vol. 40. No. 1. pp. 2-5. With 4 figs. [See this *Bulletin*, 1936, Vol. 33, p. 315.]

PAUL (Milroy). **Surgical Measures in Leprosy.**—*Internat. Jl. Leprosy*. Manila. 1936. Jan.-Mar. Vol. 4. No. 1. pp. 29-34. With 1 fig.

At the Hendala Leper Asylum of Ceylon the author found superficial ulcers of the foot in 347, or 52 per cent., of 658 inmates, and perforating ulcer of the foot in 27 patients. In the former he obtained regular success by applying adhesive plaster directly to the ulcers, after cleaning with warm water, and covering with dressings to absorb the purulent discharge, and changing the latter only when they became

soaked, so as to leave the epithelium to grow over the surface undisturbed. No chronic ulcer failed to improve and all healed with perseverance with the method. For perforating ulcers he agrees that necrosed fragments or the whole carious metatarsal bone should be removed, preferably through a dorsal incision. Amputations should be avoided as far as possible, as the patients can rarely wear an artificial limb. For burns of the fingers the tannic acid treatment is not suitable, and he advises the use of bakelite cups, etc., which do not conduct heat well and are not easily broken, in place of metal ones in order to avoid burns of the anaesthetic fingers. L. R.

BROWN (James A. K.). Some Dietetic Factors in Leprosy with Special Reference to B Avitaminosis.—*West African Med. Jl.* 1935. Nov. Vol. 8. No. 4. pp. 1-7. [59 refs.]

The author quotes from various authorities statements regarding the importance of diet in leprosy, and goes on to advocate the administration of vitamins. Working in the Uzuakoli Leper Colony, Nigeria, he found the diet adequate in 57.5, marginal in 20 and inadequate in 22.5 per cent. of his cases. He tested the value of giving vitamin B in the form of marmite and an extract of rice polishings prepared by Messrs. Ferris of Bristol, but states that "the results did not show any definite improvement," although 43.4 per cent. did show gain in weight. It is hoped to test further the use of vitamins A and B. L. R.

REENSTIERNA (John). Therapeutic Tests with an Anti-Leprosy Serum. (In Sweden and Ethiopia.)—*Acta Med. Scandinavica.* 1936. Vol. 88. No. 2-4. pp. 399-406.

The author states that his serum is made by injecting sheep repeatedly with acid-fast bacilli and their toxins, including Kedrowsky's and Paldrock's cultures and a very similar one the author cultivated from a case of leprosy. A detailed description of its preparation will be published later. The serum has been used in 4 cases at the Jarvso Leprosarium and in over 30 cases at Addis Ababa in Ethiopia, and it is claimed that in all patients except those who were moribund the ulcers healed, nodules subsided and in 65 per cent. of the cases sensibility returned in fingers and toes. The author says that only "a very inconsiderable beginning" has yet been made with the trial of his serum. Further reports will be awaited with interest. L. R.

FISCHL (Viktor). Zur Chemotherapie der Tuberkulose und Lepra. [Chemotherapy of Tuberculosis and Leprosy.]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1935. May 29. Vol. 85. No. 1/2. pp. 71-76.

The author gives a table of chaulmoogra and other oils used in the treatment of tuberculosis and leprosy, and he concludes from experiments on mice infected with avian tubercle that no surely efficacious preparation has yet been obtained. L. R.

GOLOVINE (S.). Contribution à l'étude du traitement de la lèpre.—*Bull. Soc. Path. Exot.* 1935. Nov. 13. Vol. 28. No. 9. pp. 784-789.

HOFFMANN (W. H.). Las modernas orientaciones sobre la lepra.—Reprinted from *Rev. Med. y Cirug. Habana.* 1935. Vol. 40. No. 6. pp. 310-323.

YELLOW FEVER.

SAWYER (Wilbur A.). **The Present Geographic Distribution of Yellow Fever and its Significance.**—Reprinted from the *Harvey Lectures, 1934-1935*. pp. 66-92. With 5 maps. [32 refs.]

An interesting general account of the subject with special reference to yellow fever immunity observations and the new light they throw on the epidemiology and general distribution of the disease. In yellow fever, as in many other infectious diseases, it is becoming evident that missed cases comprise the majority of the infections, and the author mentions that if suitable laboratory tests had been available, the leaders in yellow fever thought and work in the past would not have concluded that the disease depended for its persistence on endemic foci in a limited number of key cities. *E. Hindle.*

FINDLAY (G. M.) & DAVEY (T. H.). **Yellow Fever in the Gambia. I. Historical.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Apr. 8. Vol. 29. No. 6. pp. 667-678. With 1 chart. [27 refs.]

An interesting compilation of the history of outbreaks of epidemic disease in the Gambia from its discovery in 1455. These periodic outbreaks have been attended by a high mortality and occurred before and after the introduction of cinchona bark as a routine treatment of fever. However, proof that the earlier epidemics were due to yellow fever is lacking, but in view of the problem as to whether the disease is of African or American origin, it is worthy of note that there has been no change in the general character of these epidemics either before or after the discovery of America, either before or after the institution of the slave trade, and either before or after the general introduction of cinchona bark as a routine treatment for tropical fevers.

Since the foundation of Bathurst in 1816, outbreaks of yellow fever have occurred periodically in the town, but have not been recorded in the Gambia Protectorate. There is a faint suggestion that the Bathurst epidemics occur at intervals of either from 5 to 6 or from 11 to 12 years and a chart is given showing their correlation with variations in the sun-spot cycle. Eight out of 11 sun-spot minima between 1825 and 1935 have been associated with outbreaks of yellow fever in the Gambia. Three others occurred at or near the sun-spot maxima, and the fourth outbreak in 1862 was probably merely a continuation of the 1859-60 epidemic. *E. H.*

DURAND (R.) & BONNEAU (E.). Enquête faite dans un bataillon de tirailleurs sénégalais en vue de déceler, par les épreuves sérologiques, les atteintes antérieures de fièvre jaune. [**An Inquiry made among a Battalion of Senegalese in order to determine, by Serological Tests, Previous Infections with Yellow Fever.**]—*Bull. Soc. Path. Exot.* 1936. Feb. 12. Vol. 29. No. 2. pp. 100-101.

The authors have examined the sera of 31 soldiers from a Senegalese battalion, originally from West Africa but now completing their service in Tunisia. All the subjects were aged from 20 to 35 years and their blood was tested by means of the mouse protection test.

The results are given in the following table, which shows that more than 30 per cent. were positive and supports the view as to the frequency of this infection among the African natives.

Colonies	Number of subjects examined	Positive	Negative
Dahomey	3	1	2
French Sudan	7	4	3
French Guinea	9	5	4
Ivory Coast	8	0	8
Upper Volta	4	1	3
Total	31	11	20

E. H.

PARIS: OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. Session of May, 1936. Report of the Yellow Fever Commission. [Mimeographed translation.]

SOPER (F. I.). Recent Extensions of Knowledge of Yellow Fever. [Annex I to Report of Committee on Yellow Fever, Pan-African Health Conference, Johannesburg, Nov. 20-30, 1935.]—*Quarterly Bull. Health Organisation. League of Nations.* Geneva. 1936. Mar. Vol. 5. No. 1. pp. 19-68. With 4 graphs, 1 map & 2 figs. [36 refs.]

SELWYN-CLARKE (P. S.). **Yellow Fever in West Africa.** [Annex II to Report of Committee on Yellow Fever Pan-African Health Conference, Johannesburg, Nov. 20-30, 1935.]—*Quarterly Bull. Health Organisation. League of Nations.* Geneva. 1936. Mar. Vol. 5. No. 1. pp. 69-78.

A general review of the subject with special reference to the epidemiology of the disease and preventive measures in West Africa.

E. H.

LLOYD (Bolivar J.). **Public Health Significance of our Newer Knowledge of Yellow Fever.**—*Southern Med. J.* 1936. May. Vol. 29. No. 5. pp. 533-536.

A general account, with special reference to the methods of dealing with certain reported cases of yellow fever in the past.

E. H.

HICKS (E. P.) & CHAND (Subedar Diwan). **Transport and Control of *Aedes aegypti* in Aeroplanes.**—*Records of the Malaria Survey of India.* 1936. Mar. Vol. 6. No. 1. pp. 73-90. With 2 figs. & 1 map. [24 refs.]

Female *Aedes aegypti* in cages were placed in the baggage compartment of aeroplanes at Karachi and travelled alive to Amsterdam and over a considerable part of the return journey, although they had no opportunity of feeding en route, and also a pyrethrum spray is used as a routine in the cabins. It would seem, therefore, that this mosquito suffers no ill-effects when exposed to reduced atmospheric pressure.

Experiments showed that *Aedes aegypti* in aeroplanes are destroyed by a spray of "Pyrocide 20" in amounts equivalent to 3 cc. per 1,000 cubic feet, with an exposure of 5 minutes for cabins and baggage rooms and 15 minutes for less accessible spaces. Before use this dose is diluted 1 : 20 with kerosene. The results of some experiments suggested that the killing effect of the mixture varied with the dose of pyrocide and that the degree of dilution was of minor importance, but changes in humidity produced different effects.

The authors examined 106 air liners arriving at Karachi but no mosquitoes were found. After discussing the known distribution of yellow fever in Africa it is concluded that at present there is little danger of the import of infected *Aedes aegypti* from the Sudan to India, but the danger from Nigeria is rather greater. *E. H.*

SPRANGER (H.). Das Internationale Sanitätsabkommen für die Luftfahrt und seine Bedeutung vor allem für die Verhütung des Gelbfiebers im internationalen Luftverkehr. [**The Health Agreement for International Air Traffic particularly with regard to the Prevention of Yellow Fever.**—*Deut. Med. Woch.* 1936. Mar. 27. Vol. 62. No. 13. pp. 514–518. With 1 map. [Summary appears also in *Bulletin of Hygiene.*]

Owing to the spread of air travel there is a danger that persons who are already infected may travel during the incubation period thousands of miles from where the infection occurred, and even, as in the case of smallpox, spend several days in the country of arrival before the disease develops. In the case of yellow fever with an incubation period up to 13 days [though it is usually only 4 or 5 days] the infection may be carried from the infected parts of Africa to India.

By an international agreement made in 1934 it is provided that officials at air ports can refuse to allow persons to travel who in the opinion of the medical officer attached to the airport show any signs of infectious disease, and may require suspicious cases to undergo a period of observation. Intending passengers who have not had smallpox are required to show that they have been vaccinated not longer than three years or less than twelve days before. At each international airport a doctor must always be available and a room provided for medical examination. Provision must also be made for the isolation of cases at the airport or its vicinity, and arrangements must be made for sending specimens to a laboratory and for necessary disinfection measures. Special precautions against yellow fever are taken in Germany on the arrival of Zeppelins from Brazil, although it is considered very unlikely that that disease could spread in Europe. In Africa, however, there is a danger of the infection being carried from one part of that continent to another and attention is called to the value of the mouse test to determine immunity. This test is in use in British Gambia, the Gold Coast, Nigeria, French West Africa, Brazil, the Belgian Congo and the Sudan.

The disinfection of aeroplanes against mosquitoes is carried out by spraying a mixture of 1 part of a 2 per cent. solution of pyrethrum in paraffin with 4 parts of a 2 per cent. solution of pyrethrum in carbon-tetrachloride. Mosquitoes are killed in 5 minutes when the mixture is used in quantities of 5 cc. for each 1,000 cubic feet. Similar results

are obtained with the same mixture but with no pyrethrum dissolved in the carbontetrachloride. [See also *Bull. of Hyg.*, Vol. 11, p. 217.]

A. J. Collis.

SYMES (C. B.). Insects in Aeroplanes. [Annex III to Report of Committee on Yellow Fever, Pan-African Health Conference, Johannesburg, Nov. 20-30, 1935.]—*Quarterly Bull. Health Organisation. League of Nations.* Geneva. 1936. Mar. Vol. 5. No. 1. pp. 79-86. [See this *Bulletin*, 1936, Vol. 33, p. 343.]

SPRAWSON (C. A.). **The Position of India in Regard to the Yellow Fever Question.** [Annex IV to Report of Committee on Yellow Fever, Pan-African Health Conference, Johannesburg, Nov. 20-30, 1935.]—*Quarterly Bull. Health Organisation. League of Nations.* Geneva. 1936. Mar. Vol. 5. No. 1. pp. 87-88.

In view of the danger to India of the introduction of yellow fever, the author recommends a thorough examination by mouse protection and viscerotome tests of the neighbourhood of all aeroplane stopping-places in the Anglo-Egyptian Sudan, Kenya and Uganda, and further tests to determine the limits of its endemicity. Moreover, the crews of all planes crossing from Africa to India should be vaccinated against yellow fever.

E. H.

BANA (F. D.). **A Practical Way of dealing with *Aedes aegypti* (*Stegomyia fasciata*) Mosquito Breeding in Country Craft.**—*Indian Med. Gaz.* 1936. Feb. Vol. 71. No. 2. pp. 79-80.

The author calls attention to the prevalence of *Aedes aegypti* on small craft, particularly sailing ships of several types, which enter Bombay. In less than 2 months he examined 898 of these ships, and found the yellow fever mosquito breeding in 458.

At present it is only possible to empty out the drinking water containers if the master agrees. Statutory powers are required to enforce mosquito proofing, etc.

P. A. Buxton.

SELLARDS (Andrew Watson) & LAIGRET (Jean). Nouvelle démonstration de l'efficacité de la vaccination contre la fièvre jaune. [**A New Demonstration of the Efficacy of Vaccination against Yellow Fever.**]—*C. R. Acad. Sci.* 1936. Apr. 27. Vol. 202. No. 17. pp. 1467-1468.

The authors state that 12,000 persons in French West Africa have been vaccinated by the use of attenuated mouse virus, without a single case of yellow fever having occurred amongst them, although cases have occurred amongst non-vaccinated persons.

A volunteer received a single injection of 15 mouse units in a suspension of brain after 256 passages in mice. Living virus was detected in his blood circulation, but the patient showed no obvious clinical reactions. Seven months later this subject was bitten by 4 infected mosquitoes, *Aedes aegypti*. Three of these mosquitoes were subsequently fed separately on three monkeys, two of which died of typical yellow fever. The vaccinated person, though bitten by certainly infected mosquitoes, showed no signs of any reaction, a direct demonstration of the efficacy of this method of vaccination.

E. H.

NICOLLE (Charles) & LAIGRET (J.). Vaccination contre la fièvre jaune à l'aide d'une seule inoculation du virus amaril vivant, desséché et enrobé. [**Vaccination against Yellow Fever by Means of a Single Inoculation of Living Yellow Fever Virus, Dried and Coated.**]—*Arch. Inst. Pasteur de Tunis*. 1936. Jan. Vol. 25. No. 1. pp. 28-39.

A detailed account of the method previously described [see this *Bulletin*, 1935, Vol. 32, p. 880].

In a footnote at the end of their paper, the authors state that in November, 1935, 100 persons had been treated by this method of vaccination in France, and large applications are in progress in French West Africa, the Cameroons and the Lake Tchad region. The method now definitely selected is a single inoculation of dried virus simply "coated" in egg-yolk. E. H.

STEFANOPOULO (G. J.). Sur la vaccination contre la fièvre jaune. [**Vaccination against Yellow Fever.**]—*Bull. Soc. Path. Exot.* 1936. Apr. 1. Vol. 29. No. 4. pp. 359-360.

A brief statement of the method of procedure in applying serum vaccination (as distinct from Laigret's method) against yellow fever, at the Institut Pasteur, Paris. Up to date 103 persons have been vaccinated and in general the treatment has not produced any very marked ill effects, beyond the usual febrile reactions following any serum therapy in particularly sensitive patients. The only exception is the case described by MOLLARET [see below]. Yellow fever virus has never been recovered from the blood of any of the subjects. E. H.

i. DARRÉ (H.) & MOLLARET (P.). Etude clinique d'un cas de méningo-encéphalite au cours de la séro-vaccination anti-amarile. Ménin-gite aiguë avec lymphocytose considérable, modifications de la réaction du benjoin colloïdal, épilepsie, narcolepsie et confusion mentale. Double poussée secondaire d'hypertension intra-cranienne. Guérison sans séquelles. [**A Clinical Study of a Case of Meningo-Encephalitis during the Course of Yellow Fever Serum-Vaccination.**]—*Bull. Soc. Path. Exot.* 1936. Feb. 12. Vol. 29. No. 2. pp. 169-176.

ii. MOLLARET (P.), with the collaboration of G. M. FINDLAY. Étude étiologique et microbiologique d'un cas de méningo-encéphalite au cours de la séro-vaccination anti-amarile. [**An Etiological and Microbiological Study of a Case of Meningo-Encephalitis during the Course of Anti-Yellow Fever Serum Vaccination.**]—*Ibid.* pp. 176-185.

i. A description of the first case of a nervous accident observed in Professor PETTIT's laboratory during the course of serum-vaccination against yellow fever dating back to 1933.

The patient, a woman of 25 years, developed nervous symptoms 11 days after the inoculation of horse immune serum and mouse yellow fever virus.

A study of the case showed the presence of an acute meningitis with considerable lymphocytosis, modifications in the colloidal benzoin reaction, epilepsy, narcolepsy and mental confusion, and intra-cranial

hypertension. After three to four weeks the patient recovered without any sequelae.

The authors, after a careful discussion of the symptoms, come to the conclusion that on clinical grounds there is reason to doubt whether this acute meningitis was due to the yellow fever virus, and incline to the hypothesis that a spontaneous mouse virus was present in the material used for the vaccination. [See MARTIN, R., ROUESSE, G. & BONNEFOI, A., below.]

ii. A microbiological study of the case referred to above. The vaccine in this case had been used in London for the vaccination of six patients none of whom showed any ill effects. Two months later this vaccine was used in Paris for the vaccination of four patients who after the same incubation period all gave abnormal reactions, including the case under discussion. All showed a marked rise in temperature starting about the 12th day, which was of short duration in two of the cases, of long duration in the other two, and in one of these accompanied by meningitis. In a detailed account of experiments with this vaccine the author brings forward very interesting and suggestive experimental evidence in support of the hypothesis that this meningitis was the result of infection with some adventitious virus present in the brains of the mice from which the vaccine was prepared. The original should be consulted for details, but in view of the variety of neurotropic viruses that have now been discovered in mice, it is not unreasonable to assume that the cases in question may have been the result of an unknown mouse virus capable of being pathogenic to man. E. H.

LAIGRET. De l'interprétation des troubles consécutifs aux vaccinations par les virus vivants, en particulier à la vaccination de la fièvre jaune. [**The Interpretation of the Troubles following Vaccination with Living Virus, especially after Yellow Fever Vaccination.**]—*Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 230-234.

The author discusses the nature of the nervous troubles occasionally observed after vaccination against yellow fever, and mentions that out of at least 12,000 persons vaccinated up to date only 4 of them have shown any nervous reactions and none have been fatal.

The greater part of the paper comprises a polemical discussion of the nature of the case of meningo-encephalitis described by MOLLARET & FINDLAY [*ante*] and their interpretation. The author himself claims to have isolated from yellow fever mice another virus, which is not pathogenic to man, but considers that the danger of such a foreign virus is insignificant in view of their practical results, and once again reaffirms that the inoculation of immune serum merely adds to the inconvenience of treatment and is of no value. E. H.

MARTIN (René), ROUESSE (Gustave) & BONNEFOI (Antoine). Cent cas de vaccination anti-marielle (vaccin Laigret) pratiquée à l'hôpital Pasteur. [**One Hundred Cases of Anti-Yellow Fever Vaccination (Laigret's Vaccine) practised at the Pasteur Hospital.**]—*Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 295-313. [11 refs.] Discussion pp. 234-238.

A detailed account of clinical observations on 100 patients inoculated with neurotropic mouse virus at the Pasteur Hospital in Paris; the

earlier method of 3 doses of attenuated virus was used in 38 cases, dried and coated vaccine in 59 cases, and the remaining 3 received both kinds of vaccine. The results show that in a number of cases there is a distinct febrile reaction, which in the first method generally appears about 3 days after vaccination, but when coated vaccine is employed does not appear as a rule until 5 to 7 days after the inoculation. The reaction usually was not severe and often was absent, but two cases are described which showed marked nervous reactions although both recovered. Attempts to infect mice from these patients were negative, but the authors bring forward evidence in support of their view that the symptoms were the result of infection with yellow fever virus. Although the nervous symptoms only developed on the 14th day, whilst the usual incubation period of yellow fever is 3 to 6 days, the late recognition of symptoms may be more apparent than real. The failure to infect mice is of little significance for the blood of ordinary cases of yellow fever is rarely infective for more than two or three days. Both patients showed a high titre of yellow fever immunity on the 25th day after vaccination with only a single dose of attenuated virus, another fact which tends to confirm their opinion that these were cases of infection with yellow fever rather than with a spontaneous mouse virus.

In the discussion MOLLARET & LÉPINE both called attention to the uncertainties of these cases. The existence of a spontaneous mouse virus in Paris producing meningitic symptoms in monkeys (Lépine) is considered to support the view that these rare nervous cases developing after yellow fever vaccination are not necessarily due to yellow fever virus [see LÉPINE, P. & SAUTTER, V. Existence en France du virus murin de la chorio-méningite lymphocytaire. *C. R. Acad. Sci.*, 1936, Vol. 202, p. 1624. *Bull. of Hyg.*, 1936, Vol. 11, p. 617]. E. H.

LHERMITTE (J.) & FRIBOURG-BLANC. Encéphalo-myéélite subaiguë consécutive à la vaccination antiamarile. [**Subacute Encephalomyelitis following Yellow Fever Inoculation.**]—*Rev. Neurol.* 1936, Feb. Vol. 65. No. 2 pp. 391-407. With 14 figs.

In August 1934, a French colonial official, aged 32, was immunized against yellow fever by Laigret's vaccine. He received only the first of the three injections of neurotropic yellow fever virus as the inoculation was followed by a severe reaction with fever, headache and attacks of giddiness: a few days later nervous symptoms developed in the lower limbs, fatigue with loss of power, cramps, a feeling of cold and formication. These all disappeared at the end of three weeks and the patient's history was uneventful till the middle of December at which time, while on tour, he developed dysentery. As the dysenteric symptoms cleared up the former symptoms in the legs reappeared, and rapidly became severe. Walking became difficult, he lost flesh, particularly in the lower limbs, and had difficulty in passing urine and faeces. At the same time there was progressive loss of sensation beginning in the legs and extending to the thighs and later to the forearms. On January 31st, the patient took to his bed and never left it again, for his symptoms gradually progressed till his death in October 1935, exactly 14 months after the yellow fever inoculation. A thorough histological examination of the central nervous system revealed such extensive but scattered islets of myelin degeneration

that the case might well have been one of disseminated sclerosis were it not for the intensity of the vascular lesions in the cord, the flame-shaped ("en flammèches") distribution of certain islets of degeneration together with the extent and degree of the cytolytic changes in the cells of the brain. The clinical symptoms and pathological lesions were thus those of disseminated encephalomyelitis rather than of multiple sclerosis.

G. M. Findlay.

SAWYER (Wilbur A.). **The Duration of Yellow Fever Immunity after Vaccination and after the Disease.**—Reprinted from *Trans. Assoc. Amer. Physicians*. 1935. Vol. 50. 6 pp. With 4 charts.

The titration results for 144 specimens of serum from 45 persons vaccinated against yellow fever indicate that protective antibody becomes demonstrable one or two weeks after vaccination and rises rapidly for a month or six weeks. Soon after the peak there begins a definite and continuous descent at a steadily decreasing rate and towards the end of the fourth year the mean titre has fallen from between 64 and 128 to between 2 and 8, but the rate of fall has diminished until the curve is almost level. In two cases the serum ceased to protect after two years and one person failed to develop any immunity, but the great majority would seem to be immune for at least four years, some possibly for life. For comparison with the duration of immunity after the natural disease, 69 specimens were collected from 53 persons who had had yellow fever on known dates. The titres of the sera taken within four months of the onset of illness are in a class apart from those examined later. This group of cases was mainly from recent epidemics in Brazil and Colombia, and the height of their titres is very similar to that of vaccinated persons. On the whole, however, the attacks of yellow fever seem to be followed by a higher immunity and a slower fall in protective antibody titre than after vaccination, but there seem to be differences in the effects produced by different strains of virus. The curve of the mean titres of sera of persons having had the disease several years previously, up to 55 years, shows an almost horizontal line between titres of 64 and 16, which confirms the general observation of the past that the immunity following an attack of yellow fever endures, as a rule, for life.

With regard to vaccination, it would seem to be a wise precaution to retest persons every two or three years, and to revaccinate if the protective power of the serum is low or absent.

E. H.

NICOLAU (S.), MATHIS (M.) & BAFFET (O.). Modification de certaines propriétés d'une souche de virus amaril entretenue pendant près de quatre ans sur cobayes. [**The Modifications of Certain Properties of a Yellow Fever Strain during nearly Four Years in Guinea-pigs.**]—*C. R. Soc. Biol.* 1936. Vol. 122. No. 17. pp. 203-206. [12 refs.]

A study of the changes observed in the French strain of yellow fever virus after 35 passages in guinea-pigs. This study started in 1933 and has been continued to the present time.

At first numerous large inclusion bodies were found in the central nervous system of all infected guinea-pigs when inoculated intracerebrally with either the neurotropic or viscerotropic strain. Towards the 10th passage there was a diminution in their number and eventually

the intranuclear bodies disappeared almost entirely from the neurons, and in certain guineapigs it has been impossible to find a single nerve cell containing yellow fever inclusions, but on the other hand they could always be found in the glial cells.

The incubation period has gradually lengthened from an average of 9.4 days duration from inoculation to death, up to an average of 13 days' duration.

E. H.

LLOYD (Wray), THEILER (Max) & RICCI (N. I.). **Modification of the Virulence of Yellow Fever Virus by Cultivation in Tissues *in vitro*.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Feb. 29. Vol. 29. No. 5. pp. 481–529. With 4 graphs. [29 refs.]

A very detailed account of the changes in virulence undergone by yellow fever virus after cultivation during a period of 21 months and through more than 150 subcultures *in vitro* without any intercurrent animal passage.

Pantropic yellow fever virus has been cultivated for more than 130 subcultures in media consisting of serum-Tyrode solution and minced tissue of mouse embryo, chicken embryo or adult mouse testis. The same strain has been grown also for more than 55 passages in a medium of serum-Tyrode solution and minced adult guineapig testicular tissue, and for more than 20 transfers in the same fluid medium and chicken embryo dermis.

Neurotropic virus of both relatively early and late mouse passage has been cultivated for more than 120 subcultures in serum-Tyrode solution and minced chicken embryo. Neurotropic virus of late mouse passage has been grown for 55 transfers in serum-Tyrode solution and minced mouse embryo, and also for 86 subcultures in Tyrode solution containing minced chicken embryo.

The cultivated strains of pantropic yellow fever virus show consistently a progressive loss of the power to produce yellow fever in *rhesus* monkeys following inoculation. The neurotropic affinities of this virus in mice and monkeys, however, do not seem to increase during cultivation.

A strain of pantropic yellow fever virus grown for 92 subcultures in serum-Tyrode solution containing mouse embryo tissue, when passaged for 30 transfers in *Macacus rhesus* only slowly regained its virulence for monkeys. The increase in virulence was shown by the death of 6 of these 30 monkeys. None of them died of yellow fever encephalitis. Monkeys become highly immunized against yellow fever if inoculated with the pantropic virus cultivated in mouse embryonic tissue, together with human immune serum. Evident serum immunity can be produced by a dose of virus equivalent to 34 minimal lethal doses for a mouse, and human immune serum (titre 128) in a ratio of 0.5 cc. per kilo body weight, completely or nearly completely protects monkeys against the appearance of detectable virus in the circulating blood.

The antigenic power of neurotropic virus of mouse brain origin and cultivated pantropic virus grown in mouse embryonic tissue was found to be approximately the same when tested by inoculation into immune persons. The serum antibody titre with both rises rapidly after inoculation of the virus to reach a peak usually at 2 weeks and falls rapidly to its initial level at about 4 weeks.

The results of the immunization of 26 persons with pantropic yellow

fever virus cultivated in mouse embryonic tissue, in the presence of an existing passive immunity, produced by the concomitant injection of a titrated quantity of human immune serum, are recorded in detail. The reactions following inoculation were minimal or absent. The sera of 13 individuals titrated for protective antibodies during the period from 14 to 28 days after inoculation showed titres ranging from 8 to +256.

This long article should be consulted in the original by all those interested in the subject as it contains details of the technique employed for the cultivation of yellow fever virus and the results obtained with various methods and different strains. E. H.

GORDON (John E.) & HUGHES (Thomas P.). **A Study of Inactivated Yellow Fever Virus as an Immunizing Agent.**—*Jl. Immunology*. 1936. Mar. Vol. 30. No. 3. pp. 221–234. With 2 figs. [18 refs.]

The authors inactivated yellow fever virus by means of heat, exposure to ultra-violet light, and the action of formaldehyde, and tested the material by inoculation into both monkeys and mice. In no instance was any demonstrable immunity produced by inactivated virus and when immunity did occur it was the result of a demonstrated infection. Neither a solid nor a partial immunity followed the parenteral injection of large amounts of inactivated virus, either of the viscerotropic or neurotropic form. E. H.

LLOYD (Wray) & MAHAFFY (A. F.). **Yellow Fever Virus Encephalitis in African and Asiatic Monkeys.**—*Amer. Jl. Trop. Med.* 1936. Jan. Vol. 16. No. 1. pp. 73–75. [14 refs.]

A record of the production of experimental yellow fever virus encephalitis in one *Macacus cynomolgus*, one *Cercopithecus tantalus*, two *C. mona*, and two *Erythrocebus patas*. All these monkeys were inoculated in the left frontal lobe with 0.5 to 1.0 cc. of a Berkefeld N filtrate of the brain of a mouse infected with neurotropic yellow fever virus after more than 200 passages in mice.

The monkeys died of encephalitis after 6 to 9 days and at death virus was isolated from the brain, and either the sciatic or the ulnar nerve, and also, with one exception, the adrenal. It was absent from the blood, cerebrospinal fluid and general viscera of those monkeys examined. All these animals are thus shown to be highly susceptible to neurotropic yellow fever virus. E. H.

MOLLARET (Pierre). **Le traitement de la fièvre jaune.**

This book was reviewed on p. 569.

MISCELLANEOUS.

JAMAICA. Report of the Bacteriological and Pathological Laboratory, 1935 [EVANS (K. Leigh), Govt. Bacteriologist & Pathologist]. 3 typed pp. 1935. Kingston.

The work of the laboratory as reported by Dr. K. Leigh Evans has increased by nearly 50 per cent. in the total of specimens dealt with, but these practically all were in connexion with routine clinical pathology. Of the 39,566 specimens examined 22,634 or 57·2 per cent. were from the General Hospital, 3,440 or 8·7 from Health Officers and 2,958 or 7·4 per cent. from private practitioners. For diagnosis of syphilis the Kahn test is employed, and the number of sera tested was nearly double that of the preceding year, 15,366 in place of 8,842. The sera of all patients admitted to the Public Hospital, Kingston, are tested as a routine measure and nearly half (43 per cent.) gave a positive reaction. Tests were also carried out on placental blood of patients in the Maternity Hospital, 1,166 in all. Comparative tests were undertaken in the latter part of the year with placental and venous blood. Of 218 so tested, 52 were positive in blood taken by venepuncture of which 20 were negative with placental blood; in one instance only did the reverse obtain.

Next in order came Widal tests for enteric fever; these also have nearly doubled, from 2,526 to 4,869. Between 44 and 45 per cent. were examinations for agglutinins to the *Bact. paratyphosum*, such being carried out on all those negative to *Bact. typhosum* whose smears revealed no malaria parasites [why those negative to *Bact. typhosum* but showing malaria parasites should not be tested is not stated; perhaps time could not be spared for this. Information of value might, however, accrue for the combination of enteric fever and malaria may in some cases be very mild, in fact so mild clinically as to escape observation; see this *Bulletin*, 1920, Vol. 15, p. 252]. Of nearly eleven hundred sera tested, only 8 were positive for *Bact. paratyphosum A* and 4 for *Bact. paratyphosum B*.

Blood examinations for malaria parasites totalled 4,478 as compared with 2,250 in 1934. About one-third of these were in connexion with the work of the Malaria Commission. In addition those sending up sera for Widal tests were asked to send at the same time blood smears in order that malaria parasites might be looked for; nearly one in three was positive; in 1934 one in four.

The work of the laboratory staff was further increased by examinations of serological and bacteriological character necessitated by the opening in October of a Women's Clinic for Venereal Diseases.

Lastly, experiments have been undertaken for the cultivation of *Mycobacterium tuberculosis* from sputa microscopically negative on Holmes's modification of Jensen's egg-potato medium. H. H. S.

MANSON (D.). The Scope of an Assam Tea Garden Laboratory.—*Indian Med. Gaz.* 1935. Dec. Vol. 70. No. 12. pp. 690–693.

The expenses in running a tea-garden in Assam are great, while for the good of the employees a medical laboratory is an essential; nevertheless, costly apparatus cannot be acquired and this account of what can be done in the way of routine investigation at small cost is worth placing on record. Where even this could not be afforded

by the owners of a small garden, several might club together to establish a laboratory in common. The author had three assistants, one qualified and two of the compounder class trained in the laboratory. During the past $5\frac{1}{2}$ years there has been an annual average of 2,660 blood slides examined for malaria, of which 24.1 per cent. were positive, malignant tertian predominating. In the same period of $5\frac{1}{2}$ years 24,187 anophelines have been dissected and an infectivity survey made which showed that *A. minimus* was the only important vector. Widal reactions with members of the enterica group have proved very useful to correct diagnosis and the consequent treatment of cases of fever; other routine examinations included faeces for helminthic infestation and for bacterial isolation, and sera for syphilitic infection. Finally, when in 1934 Assam was visited by a widespread epidemic of measles, serum was obtained at the laboratory from convalescents and administered to a large number (285) of contacts; only three later contracted the infection.

H. H. S.

ALVES (William D.). "O" Agglutinins for *B. typhosum* in an Uninoculated Native Population.—*South African Med. Jl.* 1936. Jan. 11. Vol. 10. No. 1. p. 6.

——. T.A.B. and Brucella Agglutinins in an Uninoculated Native Population.—*Ibid.* pp. 7-8.

——. "Normal" Agglutinins and their Bearing on the Diagnosis of Typhoid Fever by Agglutination Tests.—*Ibid.* pp. 9-10. [11 refs.] [Summary appears also in *Bulletin of Hygiene*.]

In the first of these papers the author records the O agglutinin titre for *Bact. typhosum* in 300 sera obtained from natives of Southern Rhodesia, none of whom appeared to be suffering from typhoid infection, and none of whom had been previously inoculated. The results of these tests are summarized in Tables I and II.

TABLE I

No. of sera	Negative	Percentage Positive				Total Percentage Positive
		1/50	1/125	1/250	1/500	
300	255	9.33	2.67	2	1	15

TABLE II.

Sex	No. of Sera	Positives				Total Percentage Positive
		1/50	1/125	1/250	1/500	
Male ...	174	16	6	3	1	14.92
Female ...	126	12	2	3	2	15.08

The second paper records the frequency of flagellar agglutination, at various titres, against *Bact. typhosum*, *Bact. paratyphosum A*, and *Bact. paratyphosum B*, among a sample of 530 natives, also non-infected and non-vaccinated. A similar survey of 1,050 sera for agglutinins against *Br. abortus* is included in the tabulated figures (Table I [III]).

TABLE I [III].

Bacterial suspension	No. of sera	Percentage Positive Titre				Total percentage positive
		1/50	1/125	1/250	1/500	
<i>Bact. typhosum</i> ...	530	5.1	3.8	2.2	1.5	12.6
<i>Bact. paratyphosum</i> "A"	530	—	—	—	—	—
<i>Bact. paratyphosum</i> "B"	530	—	—	—	—	—
<i>Br. abortus</i> ...	1,050	0.1	—	—	—	0.1

In the third paper the author discusses, in the light of these findings, the criteria that should be adopted in interpreting diagnostic agglutination tests for enteric infection in Southern Rhodesia, emphasizing the essential point that such criteria can be laid down only when the level of "normal agglutinins" among the general population in the locality concerned is accurately known.

[Surveys of this kind are of the greatest value, both from the practical point of view, emphasized by the author, and as an indication of the relative frequency of different types of enteric infection in different parts of the world.]

W. W. C. Topley.

YU (H.). **The Serum Treatment of Typhoid Fever.**—*Chinese Med. Jl.* 1936. Feb. Vol. 50. No. 2. pp. 159–164.

The author prepared the serum to be used according to Felix's technique, injecting 1 cc. of dried *Bact. typhosum* extract daily into a horse for 3 days, pausing for 4 days, then injecting 1 cc. of living organisms intravenously for 3 days and again resting and so on with increasing doses for 10 weeks. The agglutinin titre was then 1 in 25,600 and the animal was bled. The dosage used for treatment was 2–4 doses of 20–50 cc., and the patients selected were those in an early stage of illness, as soon as the diagnosis was certain, *i.e.*, patients with clinical symptoms of enteric fever, proved by positive Widal and blood culture. Fifteen such patients were treated; 8 showed definite improvement—fall in temperature and diminution of toxic symptoms; 2 showed reduction of toxæmia but no fall in temperature; 5 appeared to be unaffected. Four others were given serum received from Dr. FELIX; they were given rather smaller doses. Two showed "dramatic improvement," one was unaffected, the other showed an improvement in the toxic symptoms. The method is worthy of further trial.

H. H. S.

BRUG (S. L.). Tropische ziekten, die niet in Nederlandsch-Indië voorkomen. —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1936. Feb 4. Vol. 76. No. 5. pp. 259–271.

KUO (K. W.), TAKAHARA (K.), ADACHI (J.) & SAITO (K.). **Sweating with Heat Stroke.**—*Jl. Oriental Med.* 1935. June. Vol. 22. No. 6. [In Japanese pp. 1147–1159. With 5 charts. [15 refs.] English summary pp. 98–99.]

An account of an investigation to determine the relationship between suppression of sweat and the development of heat stroke. The subjects

of the experiments were four healthy young men in whom heat stroke was produced on 16 occasions by exposure to dry bulb temperatures of from 40° to 72°C., and wet bulb temperatures of from 38° to 48°C. The observations were begun at ordinary room temperature, and the subjects were then suddenly introduced into a hot chamber where they remained until their condition became dangerous, or until acute discomfort made it impossible to continue the exposure. Within a few minutes of entering the hot chamber the rectal temperature commenced to rise, at first slowly, but soon with increasing rapidity until the maximum height of 39.5°–40.8°C. was reached. Sweating of the chest and axilla was produced immediately on entering the hot chamber, moderate in amount for the first 5 minutes, but increasing enormously and approaching the maximum during the following 15 or 20 minutes. With the onset of stupor, the sweating decreased abruptly and approached suppression, and at this stage the condition of the subjects became so critical as to compel the breaking off of the experiment. On returning to cool air, the sweating suddenly recommenced (although the rectal temperature still remained high) and then diminished gradually. Such a suppression of sweat occurred in 7 out of 16 experiments, and was found when the subject was about to fall into a condition of stupor. From this experiment the authors conclude that suppression of sweat has no causal significance in the production of heat stroke, but is merely a phenomenon which occurs in heat stroke of a severe degree.

W. P. MacArthur.

LEE (Douglas H. K.). **The Human Organism and Hot Environments.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. June 29. Vol. 29. No. 1. pp. 7–20. [38 refs.] Discussion pp. 20–30.

The author describes four crises which occur in physiological reactions to heat: (1) Hyperpyrexia; (2) Circulatory Insufficiency; (3) Electrolyte Inbalance; (4) Super-Dehydration. The clinical syndromes which respond respectively to the foregoing are: (1) True Heat Stroke; (2) Heat Exhaustion; (3) Heat Cramps; (4) Dehydration.

Electrolyte Inbalance is defined as the lowering of the serum chloride concentration to 100 m.equ. (mille equivalent) per litre (=365 mgm. per 100 cc.), or less. As has often been pointed out, the hypochloraemia is due primarily to replacement of the water lost in sweating without simultaneous replacement of the chloride.

Super-dehydration is defined as loss of water from the body to such an extent that continued existence is threatened, should replacement not be effected. The critical point probably lies at about 20 to 25 per cent. of the body weight. Super-dehydration, among other results, brings about impairment of circulation and this in turn produces disordered metabolism, disordered nervous function and diminished heat loss. Through disordered metabolism an acidæmia is set up with further damage to the nervous system which may be affected still further by rise of temperature. Nervous disturbances become increasingly manifest and may finally pass into coma and death.

Although a large number of cases belong to one category by virtue of the great majority of symptoms, a good deal of overlapping between syndromes in any one case is probable owing to the diversity of climatic heat elements involved, and the wide range of reaction possible in the human subject.

W. P. MacArthur.

BECKETT (H. E.). **Efficacy of Aluminium Paint for Exclusion of Solar Heat.**—*Jl. Inst. Heating & Ventilating Engineers*. 1935. Nov. Vol. 3. No. 33. pp. 414–417. With 1 fig. [Summary appears also in *Bulletin of Hygiene*.]

In recent years aluminium paint has been used as a protection against over-heating by the sun on the tops of omnibuses, ambulances and other small enclosures. The research described shows that white paint is considerably better for this purpose than the particular make of aluminium paint used in the course of this research. It was also shown that aluminium paint should make a better finish for the insides of such roofs than the white paint normally used.

Wooden boxes, 3 ft. 7 ins. square and 1 ft. deep were exposed to the sun. The boxes were covered with tinplate, one side or both sides of which were treated with the paints under consideration. The results were expressed by the relative temperature excess of the plates inside the box over the outside air. Taking the temperature excess where both surfaces of the tinplate cover were painted black as 100, it was found that aluminium paint outside and white paint inside gave 66, whereas white paint outside and aluminium paint inside gave 19. The loss of petrol from cans painted with aluminium paint and with white paint, the cans having small apertures in their tops, gave results concordant with those found with the covered boxes.

T. C. Angus.

BEEK (F. J. Ch.). Een geval van de ziekte van Selter-Swift-Feer. [**A Case of Selter-Swift-Feer Disease.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1935. Oct. 29. Vol. 75. No. 22. pp. 1904–1909. [Summary appears also in *Bulletin of Hygiene*.]

The eponymous nomenclature attached to the disease which is here considered, covers that which is known very variously as trophodermatoneurosis, vegetative neurosis of the child, acrodynia, pink disease, erythroedema polyneuritis and vegetative nervous system-paralysis of children. It is a rare disease and merits record, but once seen is easily diagnosed thereafter. The symptoms in the author's case, a child of 6½ years, began after swimming; they were typical except for oedema and an eosinophilia, which might have been due to oxyuriasis.

This disease is one which usually makes its appearance between the ages of 6 months and 4 years. The first symptoms are psychical and involve change of character, loss of interest in surroundings and peevishness. These are soon succeeded by myasthenic symptoms; the child is first unable to stand and then to sit, he cannot even hold up his head. Paraesthesiae, such as formication and the feeling of burning in the palms and soles develop. Itching is a marked feature and there is a redness of the extremities due to vasodilatation ("Pink disease"). A very marked symptom is the sweating from which the child suffers and erythematous eruption. Symptoms are permanent, but may undergo paroxysmal exacerbation. One feature of the disease, tachycardia, is practically never absent and the pulse may be 140 to 180. Other symptoms are polycythaemia, which may be due to the dehydration of sweating, photophobia, salivation, bleeding from nose and gums, loss of hair and sometimes gangrene. No alteration occurs in the cerebrospinal fluid. There may be slight hyperglycaemia, some diminution of blood phosphate and slight glycosuria.

Various clinical forms are distinguished—psychic, clonic, paralytic, hyperaesthetic, and eruptive (morbilliform or scarlatiniform).

Little is known of the aetiology and contagion seems ruled out, but an epidemic character may prevail. As causes, a neurotropic virus and vitaminic deficiency are incriminated. Yeast and irradiated ergosterol have produced benefit and again the still unknown factor may be contained in raw liver. The same syndrome has been reproduced in young rats on a full vitamin diet but with white of egg as the only protein. Raw liver can cure the rats directly.

Little is known of the pathology of the disease, for the patient usually recovers. Lesions are found in the adrenals, pituitary, anterior and posterior horns of the spinal cord and in different ganglia. [See *Bulletin of Hygiene*, 1933, Vol. 8, p. 551; 1936, Vol. 11, p. 38.]

W. F. Harvey.

DALE (W. C.). "Zipp" Treatment of Ulcers.—*West African Med. J.* 1935. Nov. Vol. 8. No. 4. pp. 16–17.

A method which gives promise of reducing time and expense in the treatment of ulcers in the tropics is worth an extensive trial. The author reports success with the use of "Zipp" (zinc oxide and iodoform each 1 part, soft yellow paraffin 2 parts). It seems to heal rapidly almost all forms of chronic ulcer except those with circular outline and clean cut edges which are very likely syphilitic. The method of application is given in the following words:—

"The 'Zipp' is spread thickly on three or four thicknesses of gauze, cut to a size to cover completely the whole ulcerated surface. This is pressed evenly on to the part affected. Then a bandage made of several thicknesses of gauze is bound evenly and fairly firmly over it. The object of this is to absorb the discharge from the ulcer. Then a plaster of Paris bandage is applied firmly. The gauze prevents any undue pressure from the plaster."

If possible the dressings should be left for 3 weeks or even longer, by which time the ulcer may be found healed. If there is sloughing, the bandage may need taking down and a new one being applied after a week, at all events as soon as any discharge appears on the surface of the plaster, or tracks down below the lower end of the plaster. Four cases are detailed and reference is made to others in whom ulcers of over a year's duration cleared up after 2 or 3 applications; among them is a boy with an ulcer exposing the bones about the ankle whose condition healed without impairment of movement.

Dr. BEAUGIE of the Wesley Guild Hospital, Ilesha, also reports very favourably upon the method, but he uses the ingredients in the proportions of 2, 1, 3 instead of 1, 1, 2, thus having a smaller proportion of iodoform, and he finds strapping as serviceable as plaster of Paris bandages.

H. H. S.

FUSCO (G.) & CHIONETTI (U.). Il trattamento dell' ulcera tropicale con la bile. [The Bile Treatment of Tropical Ulcer.]—*Arch. Ital. Sci. Med. Colon.* 1935. Nov. Vol. 16. No. 11. pp. 816–818.

The ways suggested for treating tropical ulcer are legion; they may be grouped under five heads: general such as dietetic and tonic, local application of drugs, surgical methods, physical as by congestion, pressure, light, and specific as by vaccines. In Italian Somaliland

tropical ulcer is very prevalent, some 10 per cent. of the native population being affected. The bile treatment is in essentials a form of vaccine. The use of bile in reducing virulence of organisms is a widely held belief, and the author's idea is that by local application of bile the organism or organisms responsible for the ulcer are reduced in virulence but thereby lose none of their antigenic powers, in other words the bile brings about vaccination by living organisms of lowered virulence. The ox-bile is heated in a water-bath at 100°C. for 10 minutes; when cool it is applied drop by drop on the ulcer, and the wound covered with an ordinary bandage. The application is made daily or on alternate days. Cure, it is said, takes place in a few days with an average-sized ulcer and in 20-30 days in the more severe. The pain is eased as a rule after the first application. H. H. S.

ESCOMEL (E.). Gastro-entéro-côlite produite par l'ingestion du *Tyroglyphus farinae*. [**Gastro-enteritis due to *Tyroglyphus farinae*.**]—*Bull. Soc. Path. Exot.* 1935. Oct. 9. Vol. 28. No. 8. pp. 715-717. [Summary appears also in *Bulletin of Hygiene*.]

The author was called to attend a woman who was suffering from intense abdominal pain, accompanied by nausea, profuse diarrhoea, and great prostration. There was marked tenderness in the abdomen. Examination of the stools revealed large numbers of arthropods which proved to be acarids in various stages: adult females 650 by 320 μ , adult males 350 by 160 μ , nymphs 200 μ long and eggs, double-contoured, 50 by 60 μ . They proved to be stages of *Tyroglyphus farinae*. This parasite has been found in damaged flour, in muscovado (unrefined) sugar, in dried raisins, almonds, cheese, etc. The cause in the case described was dried raisins. The best treatment was elimination by means of a purgative of an oily (not saline) nature, such as liquid paraffin, other treatment being sedative for the pain and gastric distress, e.g., bismuth and opium. The parasite is said to exert its action partly by mechanical irritation and partly by a poison which it secretes or excretes. H. H. S.

HAMEED (Abdul). **Eosinophilia of Undetermined Origin.**—*Jl. Indian Med. Assoc.* 1935. Dec. Vol. 5. No. 3. pp. 99-100.

A puzzling case is recorded. A man of 30 years, a Madrasi, was admitted to hospital on account of "fever of four days' duration." No diagnosis was made, but the patient was discharged as cured five days later. After an interval of six weeks he was again admitted "for fever" and discharged cured after 4 days. Again no diagnosis was reached. History and physical signs were negative, except for a very high degree of eosinophilia with leucocytosis. He had never had asthma or any skin disease, there were no tubercle bacilli found in repeated examination of the sputum, no signs of any helminthic infestation. Nevertheless, though the erythrocytes were little reduced, the number varying between 3,400,000 and 4,680,000 per cmm., the white cells ranged between 31,300 and 50,000 of which polymorphonuclears constituted 5-19 per cent., lymphocytes 8-18 and eosinophiles up to 87 per cent. and never below 69 per cent. The author is keeping the patient under observation and future developments will be of interest. H. H. S.

ROBERTS (J. Isgaer) & TONKING (H. D.). **Notes on an East African Vesicant Beetle, *Paederus crebripunctatus* Epp.**—*Ann. Trop. Med. & Parasit.* 1935. Dec. 18. Vol. 29. No. 4. pp. 415-420. With 1 fig.

The vesicating beetle *Paederus crebripunctatus* increases to enormous numbers in Kenya after seasons of heavy rainfall. The insect is known to the European population as "Nairobi eye" on account of the conjunctivitis produced when the juices of crushed insects are rubbed into the eye. The toxic juices are set free only when the beetles are crushed. The active principle, cantharidine, is not destroyed by heat or desiccation. Notes on treatment are given; greasy applications should be avoided; compresses of magnesium sulphate give immediate relief.
V. B. Wigglesworth.

MURRAY (Ian). **"Secondary" Pellagra.**—*Glasgow Med. Jl.* 1936. Feb. Vol. 125. No. 2. pp. 49-58. [14 refs.]

An account of two cases of secondary pellagra under care in the Victoria Infirmary, Glasgow. The first was a girl aged 19 with signs of enlargement of the liver and spleen, an undetermined affection of the heart, fluid in the right pleura, who while under observation developed the signs upon which a diagnosis of pellagra was made—symmetrical pigmentation and roughening of the skin of the backs of the hands, wrists, big toes, inner aspects of the calves and thighs, associated with diarrhoea, hypochlorhydria and anaemia. She improved sufficiently, though the hepatic and splenic enlargement remained, to allow of her discharge from hospital. Three months later she died suddenly. No necropsy. The second patient was a man aged 57, shown as a "case for diagnosis" in March 1935, who exhibited a chronic symmetrical exfoliative pigmented dermatitis with hyperkeratosis of the ears, backs of the hands, fingers, toes and elbows with discoloured and ridged finger nails, associated with marked constipation, a moist furred tongue, epigastric discomfort, occasional vomiting and marked gastric hypoacidity. The knee-jerks were increased, he had lost a stone in weight and he was melancholic; there was marked anaemia and the liver was palpable. He complained of burning and itching in the hands. The skin lesions were thought to improve after the exhibition of marmite. In May jaundice developed with vomiting of blood and blood in stool and fatal issue. Post-mortem examination revealed a carcinoma of the head of the pancreas. H. S. Stannus.

KOURÍ (Pedro) & BASNUEVO (José G.). Un caso autoctono de coccidiosis humana. Tratado por el violeta de genciana. [**An Indigenous Case of Human Coccidiosis.**]—*Rev. Parasit., Clin. y Lab.* Habana. 1936. Jan.-Feb. Vol. 2. No. 1. pp. 97-98. With 3 figs. on 1 plate.

In December 1935 the patient was sent to the authors with a history that his doctor had made three examinations of his stools at intervals of several days and had found numerous oöcysts of *Isospora hominis*. The patient was put on a diet of milk and vegetables, and two further examinations at two-day intervals confirmed the previous findings. He was given Anguilucide, i.e. Gentian violet, 3 capsules daily each of 0.05 gm., one with each meal. In 3 days' time, when he had taken

45 cgm. of the dye, the stools were examined and found negative ; the same was observed 3 days later, when he had taken 90 cgm. Treatment was stopped and three further examinations at 5-day intervals were all negative. It is believed, therefore, that the patient has been cured, but he is to be kept under observation. H. H. S.

PIOT (M.). La nature du poison du lupapi. [The Toxic Principle in Lupapi.]—*Ann. Soc. Belge de Méd. Trop.* 1935. Dec. 31. Vol. 15. No. 4. pp. 529-536.

The Lupapi or, locally, Mweyeye, is the root of *Securidaca longepedunculata* Fres. It is employed by natives of the Congo as an analgesic, a purgative, to hasten labour, and occasionally suicidally by introduction *intra vaginam*. VLEURINK thought that the poisonous principle was methyl salicylate ; it has a strong odour of this when fresh. Others, however, have recorded the presence of a toxic saponin soluble in water.

The author's experimental work has been carried out with a powder of the roots collected late in the dry season, August-September. The act of pulverizing in a mortar brought on uncontrollable sneezing and an irritation of the hands. A watery extract when lightly shaken becomes covered by a froth which persists for hours. It contains a saponin (or more than one) and a little methyl salicylate. Injected intraperitoneally into guineapigs in doses of 1 cc., subcutaneously 3-4 cc., and into a rabbit 5 cc. intravenously, it produced, in the former, signs of severe pain for an hour or more ; the rabbit showed no symptoms when watched for an hour, but next day all the animals were found dead and there was evidence of very severe diarrhoea. At autopsy, the whole gastro-intestinal tract was congested, the peritoneum injected and containing blood-stained fluid. Those injected subcutaneously showed local oedema and a gelatinous condition of the adjacent muscle. Repetition of experiments showed 0.5 cc. of the macerated extract was fatal for 600 gm. guineapigs.

Haemolytic properties were tested on rabbit's blood with Merck's saponin for comparison ; it proved to be a little weaker than the latter ; all the haemolysing substance, however, was not fixed by cholesterin (as are those of most saponins). An alcoholic extract of the root is toxic, but not if the extraction is done on an aqueous extract ; in other words the watery extract removes all the poison.

We can now see the rationale of the uses to which the natives put this plant : 1. As an *analgesic for headache*. They make small incisions in the skin of the forehead and dust on the powdered root. The local irritant effect is severe and may thus affect the cerebral circulation. 2. As a *purgative*. A small piece is placed in a glass of cold water for a few minutes and the fluid drunk. This produces stimulation of the intestines and irritation of the mucosa. 3. In *prolonged labour* or *retained placenta*, the infusion is taken as for a purgative. The reason why fatal results do not usually follow the drinking of the infusion is that nearly all saponins are decomposed by the gastric juice and thereby have their activities much reduced if not annulled. 4. With *suicidal intent*, a woman powders the root, makes it into a thick paste with a little water and introduces it into the vagina. Absorption takes place and the saponin is able to exert its toxic action.

H. H. S.

SIMPSON (I. A.). **A Poisonous Variety of Star Anise.**—*Malayan Med. Jl.* 1935. Dec. Vol. 10. No. 4. pp. 140-141.

The author reports another case of poisoning by *Illicium religiosum*, taken in mistake for the non-toxic variety *I. verum*. The latter, one of the Magnoliaceae, is indigenous to south-eastern Asia and is widely cultivated in Southern China, Japan, the Philippines and in the West Indies (Jamaica); it is used for flavouring curries, etc. To the ordinary person the distinctions between the toxic and the harmless species are not very marked—details of differentiation are given in the article, and the chief are that in the fruit the carpels of the non-toxic are unequal, longer, and the summit acute and terminating by a nearly straight beak, whereas in the toxic they are mostly equal, shorter but wider and the summit ends in a short curved beak. The outer surface is much rougher in the toxic variety; the seed is less compressed and has no evident raphe, the taste is pungent and bitter and the odour resembles oil of cajuput or cardamom, whereas the non-toxic seed has a narrow raphe and odour and taste of anise.

The patient was a Tamil of 28 years who drank some milk with some of the powdered vegetable substance. In half an hour he vomited, became convulsed and died in coma within 24 hours. The only post-mortem changes were ecchymotic patches in the gastric mucosa and marked congestion of lungs and kidneys.

[SCOTT gives the following reference to *Illicium religiosum* and poisoning by it in BYAM & ARCHIBALD'S Practice of Medicine in the Tropics (Vol. 1, p. 779):—

"This plant resembles the star anise (*Illicium anisatum*) and goes by the name of 'Badiane' in China and Japan where it grows in the neighbourhood of temples and burying grounds.

"In the Philippines a decoction, denominated 'sanki,' is made from the fruit and is used for its stimulating effects.

"Cases of poisoning both by the *I. anisatum* (less commonly) and by the *I. religiosum* have been reported from the Philippines, Cochin China, and Japan. The *I. anisatum* variety is used medicinally, but the *I. religiosum*, being cheaper, is often substituted for the former and is much more poisonous.

"Symptoms. Repeated vomiting, the vomitus in some cases showing streaks of blood, diarrhoea, convulsions with loss of consciousness; during the fits there is cyanosis of the features with cessation of respiration, retraction of the head and dilated pupils. Pains in the head and cramps in the limbs are also complained of; there may be profuse sweating, diminution to actual suppression of the urine, marked thirst, and insomnia."]

H. H. S.

RAYMOND (W. D.). **The Composition and Examination of Tanganyika Arrow Poisons.**—*Analyst.* 1936. Feb. Vol. 61. No. 719. pp. 100-103.

This paper deals with the chemical and analytical aspect of arrow poisons used in Tanganyika, the plants used belonging to *Acocanthera*, *Strophanthus* and *Adenium*. The method of obtaining the toxic principle is given and a table with the differentiating colour reactions. [The actions of these poisons are not always, indeed not often, clear-cut and experimental work only in part explains them, because it is rare for a single poison to be used. For example, several species of *Acocanthera* may be employed: *A. schimperii* (ouabain), *A. deflersii* and

A. venenata and to the extract which contains the glucoside ouabain other vegetal extracts may be added and sometimes snake venom. The root is generally used and the toxin is a potent one, killing in a few minutes by arresting the heart's action, after causing rapid, laboured breathing and convulsions; if made from the bark, the poison causes similar symptoms, with loss of muscular power but without convulsions.]
H. H. S.

WOLFF (E. K.) & AUSTIN (L. D. C.). **Preservation of Pathological Museum Specimens under Tropical Conditions.**—*Ceylon Jl. Sci.* (Sect. D. Med. Sci.) 1935. Dec. 3. Vol. 3. Pt. 4. pp. 243-247. [Summary appears also in *Bulletin of Hygiene*.]

Preservation of pathological specimens is a puzzling problem in the tropics, especially when there is a desire to conserve the colours. Kaiserling, Jores, Pick and other fluids all have their drawbacks and at times prove unsatisfactory. The authors have tried to determine what factors are responsible for preservation of the colours of tissues, and found that none of the ingredients of Jores could be omitted. The reaction of the fluid, however, was found to vary, and they prepared a neutral fixative by adding finally sufficient NaHCO_3 to produce a fluid with pH 7.0-7.2. The composition was: Sodium sulphate 220 gm., sodium chloride 90 gm., potassium sulphate 10 gm., chloral hydrate (saturated solution) 500 cc., formalin 2,000 cc., water 10,000 cc., and sodium carbonate to neutrality (20-80 gm.). Even this did not remain neutral in the presence of organic matter, and the specimens after a time turned brown, but less if there was plenty of blood. Fresh ox blood was added, therefore, but while retaining the red of the haemoglobin pale tissues (*e.g.* brain) became yellow. Substitution of blood serum, 10 cc. to every 100 cc. solution for the ox blood has proved very satisfactory, especially if watch is kept on the reaction and NaHCO_3 added when the pH falls below 7.0. It keeps for a long time, and when it is failing can be restored by occasional addition of chloral and formalin. Care must be taken to see that the fixative penetrates well. For mounting, a 3 per cent. NaCl in distilled water proved satisfactory; the crude salt may be used, and a 35 per cent. solution is saturated; this is repeatedly filtered, cleaned with animal charcoal and refiltered. It is kept in this strength as stock and diluted as required. Any tendency to blueness is counteracted by adding a few drops of 2 per cent. potassium bichromate solution. The whole is sealed with "Aquatex," or a compound of asbestos powder, pitch and linseed oil.

The steps are summarized as follows:—

- " 1. The specimens are carefully prepared and dressed.
- " 2. They are hardened in neutralized and buffered fixing solution for one to seven days.
- " 3. They are next washed in running water for three to twenty-four hours.
- " 4. If necessary they are placed in rectified spirits to improve the colour.
- " 5. They are passed through several changes of 3 per cent. sodium chloride solution.
- " 6. They are finally mounted in 3 per cent. sodium chloride solution, thymol-menthol-benzine solution sprinkled on the surface of the mounting fluid and the jar closed air tight with Aquatex."

H. H. S.

CASTRONUOVO (Giovanni). Epatosplenomegalie tropicali ed egiziane.—*Riforma Med.* 1935. Nov. 23. Vol. 51. No. 47. pp. 1793-1795.

POGGI (Igino). Contributo all'anatomia patologica dell' ainhum.—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1936. Feb. Vol. 17. No. 2. pp. 115-120. With 4 figs.

SMITH (Harry S.). The Rôle of Biotic Factors in the Determination of Population Densities.—*Jl. Econom. Entom.* 1935. Dec. Vol. 28. No. 6. pp. 873-898. With 5 figs. [16 refs.]

The paper is of a theoretical nature. It considers an idealized population of insects and studies the complex factors which may affect that population at different densities.

The author draws a clear distinction between those factors which affect the population of insects to a constant extent and those other factors, the effect of which is increased (or decreased) as the density of insects increases. The factors in the first group, those independent of density, are mainly climatic: for instance a drought or a frost may be assumed to kill the same proportion of an insect population whether it be sparse or dense; such a factor cannot for long affect the density of population because it will increase rapidly to a state of equilibrium. It is only the factors which are dependent on the density that can make a permanent effect upon the equilibrium of the population: these factors are mostly biological and they include such things as the effect of parasites and predators and the competition which may exist between individuals of the population which is being studied.

The paper is perhaps hardly suitable for abstraction, but it is an important one, helping us to understand some of the laws of increase of population, a subject fundamental to applied entomology.

P. A. Buxton.

ROMAN (E.). Le problème hygiénique des moustiques urbains. [**Urban Mosquitoes and Public Health.**]—*Rev. d'Hyg. et de Méd. Préventive.* 1936. Feb. Vol. 58. No. 2. pp. 102-112.

The author discusses the nuisance caused by urban mosquitoes in French cities and the special problem of control.

It appears that only two species of mosquito need be considered. Of these the Yellow Fever mosquito (*Aedes aegypti*) is of minor importance and confined to the south of France. The common brown *Culex pipiens* is widely distributed and a serious nuisance to the inhabitants of most towns and cities. In urban areas the representatives of this mosquito belong to the autogenous race, which can lay eggs without a blood meal, but bites man readily and breeds in heavily contaminated waters. The early stages may be found in a great variety of places, among which sewers, cess-pits, pit privies and blocked drains are important. The problem of reducing this mosquito, which is discussed at some length, is very difficult because of the existence of many potential breeding places and the need for recurrent attention to them.

P. A. Buxton.

- WEYER (Fr.). Einige Erfahrungen bei der Aufzucht von Stechmückenlarven. [Practical Rearing of Mosquito Larvae.]—*Zent. f. Bakt.* I. Abt. Orig. 1936. Feb. 13. Vol. 136. No. 1/2. pp. 111–116. With 2 figs.

Hay infusion is very satisfactory for the rearing of *Culex pipiens* and *C. fatigans*. For Anopheles larvae (*A. maculipennis*) the best results have been obtained with water containing a rich culture of saprophytic algae. If a little powdered liver or other animal substance is added to water containing such algae these grow rapidly. They provide abundant food for the larvae and at the same time keep the water thoroughly aerated so that it need not be changed.

V. B. Wigglesworth.

- FREEBORN (Stanley B.) & BERRY (Lester J.). Color Preferences of the House Fly, *Musca domestica* L.—*Jl. Econom. Entom.* 1935. Dec. Vol. 28. No. 6. pp. 913–916. With 1 fig.

It is a common practice among California dairymen to use aluminium paint on the walls as a repellent for house flies. Experiments in which a chequer board of coloured squares was set up in the dairy barn showed that aluminium paint has no particular value as a fly repellent. The flies prefer dark colours and rough surfaces.

V. B. Wigglesworth.

- WILLIAMS (C. B.) & MILNE (P. S.). A Mechanical Insect Trap.—*Bull. Entom. Res.* 1935. Dec. Vol. 26. Pt. 4. pp. 543–551. With 2 text figs. & 2 figs. on 1 plate.

- DAVIES (W. Maldwyn). A Water-Power Mechanical Insect Trap.—*Ibid.* pp. 553–557. With 3 text figs. & 2 figs. on 1 plate.

These papers describe mechanical devices which cause large funnel-shaped nets to sweep through the air. The propulsion is by electricity or water, and the methods of construction are illustrated. With either apparatus large numbers of small flying insects may be collected, and a study may be made of those which are in flight during particular periods of the day or night. The work is mentioned here because of its potential value to those who wish to sample populations of flying insects, for instance mosquitoes.

P. A. Buxton.

- ZUMPT (F.). Beobachtungen ueber Mückenbrutplätze in der Tikoebene (Kamerun)—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Mar. Vol. 40. No. 3. pp. 115–118.

- BISHOPP (F. C.). Ticks and the Rôle they play in the Transmission of Diseases.—*Smithsonian Rep.* 1933. Publication 3276. pp. 389–406. With 9 plates & 1 fig. (map).

- BUXTON (P. A.). Studies on Populations of Headlice. (*Pediculus humanus capitis*: Anoplura). I.—*Parasitology.* 1936. Jan. Vol. 28. No. 1. pp. 92–97.

The number of headlice in crops of hair from individual people in London and Lagos has been estimated by a new method.

The method consists of obtaining a standard crop of hair (from army recruits admitted into the Woolwich Dépôt and from post-mortem subjects in Lagos, West Africa), dissolving it completely in a solution of 50 gm. potassium hydroxide and 100 gm. sodium sulphide in 1 litre of tap water, filtering out the lice with a funnel of stainless steel gauze, sixty meshes to the linear inch, and counting the louse population. No lice were found in 235 specimens from Woolwich recruits collected in all months of the year. Twenty per cent. of the specimens from Lagos contained lice, the number of lice ranging from 1 to 1,286. Lice were more prevalent on the females—due probably to their rather permanent head-dressing. There was no significant difference between the different races of Africans in Lagos, nor at different seasons. This last result was expected, because the climatic conditions are so equable. Data from other parts of the world will be published later.

V. B. Wigglesworth.

LANCET. 1936. Feb. 8. pp. 330–331. **The Tropical House. An Object-Lesson at Liverpool.** [Summary appears also in *Bulletin of Hygiene*.]

Professor BLACKLOCK in a Chadwick lecture last year indicated many diseases traceable to housing defects—inadequate lighting, ventilation, draughts, damp, etc.—but in the tropics the dangers are greater because of the facilities afforded to breeding of insect vectors of specific disease. Three years ago these points were brought out in more detail by Professor BLACKLOCK in his book on *The House and Village in the Tropics* (see this *Bulletin*, 1933, Vol. 30, p. 59) and now the matter will receive still greater attention, for the Liverpool School of Tropical Medicine has rented land on which to build small replicas of houses used in different parts of the tropics, to illustrate the conditions associated therewith which may lead to the production or spread of disease. Here, students going to Liverpool to study tropical medicine and hygiene, persons, medical and lay, purposing to go to the tropics to live, may see the dangers and risks to which they may be subjected from faulty house-construction and learn how to avoid or combat them.

H. H. S.

WALKER (F.) & DIXON (D. Strangeways). **The Bug-Proof Construction of Native Dwellings.**—*East African Med. Jl.* 1936. Feb. Vol. 12. No. 11. pp. 344–347. With 2 figs.

A paper of practical importance in the tropics generally and for those responsible for the housing of natives in particular. The authors had in view the designing and construction of buildings having a minimum of suitable breeding sites for bugs, *i.e.*, elimination, as far as possible, of cracks and crevices. For *doors* and *door-frames* the usual design is unsuitable because of space being left between the frame and the wall. If this space is enlarged it ceases to harbour bugs; this is accomplished by dispensing altogether with door frames and swinging the door on vertical pins about $1\frac{1}{2}$ inches from the normal hinge. When open, the door is $\frac{1}{2}$ inch from the doorway and when closed it completely fills the doorway.

For the *bunk system of beds*, lower bed boards are supported on dwarf walls bonded into the main walls, which are plastered and corners rounded. Upper bed boards are supported on angle irons bolted to the main walls, the beds are made of three boards of 10 by 1½ inch timber not bolted, but laid on the angle or dwarf wall supports. For *roofs* the usually employed wall plates are not necessary and the space between them and the wall is a favoured breeding site for bugs. If they are not used the tops of the walls can be rounded and plastered. If roof-trusses are necessary they should not run up to the gable ends close to the walls ; if they are not used, the purlins, instead of resting on the partition walls (as is customary), should be carried on short pieces of angle iron bolted to the walls, being thus some 3 inches above the walls and allowing the walls to be rounded off. In *plastering*, all corners should be smooth and rounded off ; as a rule when both sides of a wall are plastered the plaster is pushed above the level of the top of the wall, leaving a cavity which harbours bugs innumerable. The figures in the article demonstrate the points referred to.

H. H. S.

REVIEWS AND NOTICES.

BURKE-GAFFNEY (H. J. O'D.) [B.A., M.D., B.Ch., B.A.O. (Dub.), Senior Pathologist, Tanganyika Territory]. **An Outline of Clinical Pathology for African Medical Assistants.**—124 pp. With 11 coloured plates & 5 charts. 1936. Dar-es-Salaam: Govt. Printer.

Dr. Burke-Gaffney has published in book form his course of lectures delivered to East African Hospital Assistants undergoing training. With the material at his disposal, with the type of student whom it is his duty to instruct, this course must have been difficult to plan and still more difficult to carry out, because the author would be called upon to steer an even course between the Scylla of too much specialism and the Charybdis of insufficient information, and to accomplish this demands wide knowledge of the subject and the pupil, together with a high degree of selective acumen. The work must essentially be practical and at each stage of the teaching the application of the investigation made to clinical medicine must be brought home to the student, so that he may be impressed from the first with the fact that pathology is not, for him at least, a subject divorced from practical clinical medicine.

Dr. Burke-Gaffney is to be congratulated on the success with which he has accomplished the task he set out to perform. He leads the student by the natural path of biological principles and the essentials of medical zoology to the elements of clinical pathology, explaining the use of and care for the microscope. He then, to use a term beloved of politicians, explores the various avenues revealed and studies in turn the blood in health and disease, the faeces, modes of examination and information obtainable thereby, the urine, pus, exudations, effusions and transudations, the respiratory tract and its secretions, the skin and mucous surfaces, bacteria, and so leads on to a brief but adequate account of the principles of immunity. A very useful general chapter is that on Laboratory Routine which includes equipment, modes of collecting and preserving specimens and so forth. In appendices are indicated the nature of examinations likely to afford the most useful information in the conditions present to which the hospital assistant will often have recourse. The composition of stock solutions will save his having to turn to larger manuals and the formulae for dilution and for converting a stronger into a weaker solution of known strength are of great value and will save much waste of material. Sketches of the more important technical procedures—red and white blood cell counts, Widal tests, etc.—are given, and finally a glossary of some of the more important terms in general use.

One or two small points may be mentioned, as hints for future editions which will doubtless be called for. Polymorphonuclear leucocytes are termed polymorphs, *tout court*, all through the book, though the word is not mentioned in glossary or index to explain it, and on p. 61 we have "polymorph pus." On p. 35, schizogony would be better than sporulation, and in fact 5 lines after the latter is used the former is given but not explained; the organism of relapsing fever is a spirochaete not a spirillum (p. 38); faeces is a plural noun (p. 44); μ is not defined till we come to p. 119 and it is not mentioned in the glossary though repeatedly used in the text from p. 26 onwards. *Taenia solium* (p. 50) has a double circle of hooklets, *Hymenolepis*

only one. When speaking of sputum, "nummular" is mentioned but not defined nor given in the glossary. The term cyst is defined as "a stage in the life history of certain protozoa" (in the glossary), though it will often be met with in other senses by the hospital assistant, *e.g.* hydatid, ovarian, sebaceous, dermoid and so on. Some of the illustrations might be improved, *e.g.* that of ancylostoma (plate 6) and leprosy (plate 10). As stated these are small blemishes in an excellent and painstaking work. The book is handy, convenient and well printed, and those for whom it has been produced will find it invaluable, not only in their training but for keeping by them for frequent reference.

H. H. S.

- i. CHOPRA (R. N.) [C.I.E., K.H.P., M.D. (Cantab), M.R.C.P. (Lond.), Brevet-Colonel, I.M.S., etc.]. **A Handbook of Tropical Therapeutics.**—pp. xxi+1748. 1936. Calcutta: Art Press, 20 British Indian Street. [Rs. 25.]
- ii. CALCUTTA: SCHOOL OF TROPICAL MEDICINE & CARMICHAEL HOSPITAL FOR TROPICAL DISEASES. **Pharmacopoeia and Guide.** pp. xi+153. 1936. Calcutta: Art Press. [Rs. 2/8/-.]

i. The author of this book, who has already contributed much to the elucidation of many problems in the therapy of tropical diseases, is the Director and Professor of pharmacology and therapeutics at the Calcutta School of Tropical Medicine; in this work he gives a very complete account of the present-day treatment of these diseases. The book is very well written, and, in spite of its great length, it will be read with much interest almost from cover to cover. The title is rather misleading; much more is included than one is accustomed to find in a work on medical treatment, and its scope is not restricted to the tropics.

The book begins with an account of the general principles of the action of drugs and other therapeutic measures, the different methods of administration of remedies, diet, physical methods of treatment, and so on; it includes a very detailed and practical account of blood transfusion, and an interesting description and criticism of the dietary of Indians. The next four sections of the book are concerned with the treatment of helminthic infections, diseases caused by protozoa, bacterial and virus diseases, nutritional and miscellaneous diseases of the tropics; in part VI diseases of the skin are dealt with. Then follows a section of nearly 300 pages, which is described as a dictionary of diagnosis and treatment of more or less cosmopolitan diseases. The book ends with two long appendices, containing a large amount of useful information, some of which, however, appears rather incongruously in this setting.

Probably most readers of a new book on any branch of tropical medicine will turn first of all to the subject of malaria. Dr. Chopra's account of the treatment of this disease is among the best that have appeared so far, and it bears unmistakable evidence of his own experience and critical power of judgment. Quinine and the other alkaloids of cinchona bark are well discussed, and the author's studies of the action of plasmoquin and atabrin mark a distinct advance in the knowledge of the action of these drugs. The treatment of amoebic dysentery, cholera, plague, leprosy and beriberi is described at some length and with much information of practical importance. There is a full account

of anthelmintics, their respective merits and the modes of administration of them ; and an interesting discussion of the action of salts of antimony in the treatment of kala azar, a subject to which the author has made notable contributions. There is a well-balanced section on vitamins, with a caution against the indiscriminate and excessive use of proprietary preparations of these substances. The treatment of nearly all the other diseases of the tropics is adequately, and in some cases almost exhaustively, described. At the end of the book some prescriptions are given, taken from the pharmacopoeia of the Calcutta School of Tropical Medicine, and a short account of some new and non-official drugs and preparations.

Colonel Chopra states in his preface that his book is intended to serve as a work of reference for practitioners, and to serve the requirements of senior students ; there can be no doubt that it achieves both these objects. The book is such a good one that it can be recommended with confidence ; there must be few medical men who can read it without profit.

A " Handbook " of 1,750 pages ! It is well printed and strongly bound, but it is so heavy and so thick that it is very inconvenient to handle and read ; in a future edition it would be better if it were issued in two volumes.

ii. A small book of prescriptions in use at the Carmichael Hospital, Calcutta, with brief directions for the treatment of tropical and other diseases, for blood examination, administration of test meals and other clinical procedures. A considerable proportion of the information given is included also in the Appendix of the larger work reviewed above.

H. J. Walton.

CALCUTTA. Annual Report of the Calcutta School of Tropical Medicine and the Carmichael Hospital for Tropical Diseases 1935 [CHOPRA (R. N.), Director].—191 pp. With 2 figs., 6 graphs & 2 plates. 1936. Alipore : Bengal Govt. Press.

The main objects for which the Calcutta School of Tropical Medicine was established are post-graduate teaching and research in tropical diseases. Most of its professors have been allotted beds in the Carmichael Hospital for Tropical Diseases, so that they are able to bring into practical application in treatment the results of their researches. The Annual Report for 1935 deals with the School's activities both as a post-graduate teaching centre and as a research organization. During the year investigations have been made on epidemic dropsy, cerebrospinal meningitis, hill diarrhoea, malaria, drug addiction, indigenous drugs, kala azar, hookworm, leprosy, bowel diseases, diabetes, filariasis, and other problems. Details of much of the work referred to have been given in papers and memoirs by members of the staff of the School published in the *Indian Journal of Medical Research* and the *Indian Medical Gazette* during 1935, and noticed in this *Bulletin* in the appropriate sections. These papers and memoirs have been bound up in reprint form, and are issued with the Annual Report as Appendix A containing 19 papers from *Indian Journal of Medical Research* and Appendix B containing 30 papers from the *Indian Medical Gazette*.

R. L. S.

NEVEU-LEMAIRE (M.) [Professeur Agrégé, Chef des Travaux de Parasitologie à la Faculté de Médecine de Paris]. **Traité d'Helminthologie Médicale et Vétérinaire.** [Treatise on Medical and Veterinary Helminthology.]—pp. xxiii + 1514. With 787 figs. 1936. Paris: Vigot Frères, 23 rue de l'Ecole-de-Médecine. [175 francs.]

The purpose, a difficult one, of the author is to get into one book an account of the biology, systematic position and ill effects on their hosts, definitive and intermediate, of the helminths of man and of domestic animals. Part I, General Helminthology, goes into the many aspects of the question in 70 pages. Part II, Special Helminthology, covers the systematic zoology of helminths (with many and good illustrations and a number of useful keys for the recognition of genera and species) and some consideration of disease which may be caused by the worms—a most useful compilation of nearly 1,300 pages. Part III, of 40 pages, gives a check list of helminths which make use of each particular animal as a definitive host; and Part IV of 70 pages does the same for animals which are intermediate hosts, with illustrations of a number of them. A short bibliography and an index complete a book of systematic value which will soon need rebinding if it has much use.

Clayton Lane.

REIS (J.) & NOBREGA (P.) with the collaboration of A. S. REIS. **Doenças das aves (tratado de ornithopathologia). Seção de ornithopathologia do Instituto Biológico.** [Treatise on the Diseases of Birds.]—468 pp. With 359 figs. & 4 coloured plates. 1936. Sao Paulo.

Some four years ago the authors issued a work on the diseases of birds, directed to assist those engaged in breeding of birds and in aviculture generally, and consequently of a popular rather than of a strictly scientific character. The present treatise is not merely an amplification of the older work; it is an entirely new undertaking on scientific lines, and one which is greatly needed. Each chapter is as complete as the experience of the authors and a wide search of the literature have been able to make it. Articles on the matters dealt with are published in many languages, often buried in less well-known journals and difficult to come by, hence the greater credit to the authors for having succeeded so well.

The work is divided into sections, each subdivided for purposes of description. The first deals with virus diseases, the second with bacterial, and then in order the eumycetic conditions, protozoal, helminthic and nutritional, with interspersed chapters on parasitic arthropods, and pathological anatomy and histology. Not only is each section, but each chapter, a mine of information. There are four coloured plates and over 300 illustrations in the text. Each chapter is well documented and there is a full and carefully prepared index. Further, not only is the condition in the bird described but interesting points are brought out of great interest to comparative pathology. In short, the work is indispensable to research workers engaged in veterinary or comparative pathology, and will be invaluable to pathologists at Zoological Gardens. It would have been a veritable godsend to the reviewer when he held the post of pathologist to the Zoological Society of London. The fact that it is in the Portuguese language should not

deter those little acquainted with that tongue from getting and studying the book. The text is easy to read and the illustrations abundant and clear. We hope the authors will find sufficient encouragement from its reception to arrange for translation. [The price is not stated.]
H. H. S.

BARNARD (Cyril C.) [B.A. (Lond.), Univ. Dipl. in Librarianship, F.L.A., Librarian, London School of Hygiene & Tropical Medicine, etc.]. **A Classification for Medical Libraries, with Introduction, Local List, Index of Parasites and General Index. Being a Thesis approved for the Diploma with Honours of the Library Association (1931).**—142 pp. 1936. London: Percy Lund, Humphries & Co., Ltd., 12 Bedford Square, W.C.1. [10s. 6d.] [Review appears also in *Bulletin of Hygiene*.]

The purpose of any library classification is to provide a plan for the orderly arrangement of the books. An ideal plan would bring together in one place all the publications on a particular subject, where they would be neighboured by publications on closely related subjects, thus providing, by a logical sequence of arrangement, a ready means of ascertaining the scope and nature of the literature relevant to any topic of enquiry. This ideal may be unattainable, for a difficulty common to all systems of library classification is that authors rarely confine themselves to one subject in one book and yet a book can have but one place on the shelves. Mr. Barnard's scheme of classification does, however, come as near as possible to being a perfect one for medical libraries. Its underlying principle is that of specific entry, *i.e.*, one place for each topic under which are grouped all its aspects. In this it greatly improves on older systems such as Dewey's and the Brussels Universal Decimal Classification which, for medicine at least, tend to disperse rather than gather together the literature of a subject by introducing such subdivisions as anatomy, physiology, pathology, surgery, etc., and distributing books under these various heads. Dewey and the Brussels classification are based on theoretical conceptions accepted fifty or more years ago but now out of date. Mr. Barnard's system of classification on the other hand is the result of twenty-one years of practical experience in four medical libraries of very different type, and is in actual use in the library of which he has charge at the London School of Hygiene and Tropical Medicine. Besides the synopsis and main schedules of the scheme the volume contains a full explanatory introduction, local list, index of parasites, and general index, so that by their aid users can quickly assign books and pamphlets to their appropriate places in the classification. As a "Classification for Medical Libraries" Mr. Barnard's book is both practical and thorough, and full of possibilities of usefulness to anyone wishing to arrange and classify a collection of medical publications either large or small.
R. L. S.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

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[No. 9

SLEEPING SICKNESS.

UGANDA PROTECTORATE. **Annual Report of the Human Trypanosomiasis Research Institute for the Year ended 31st December, 1935** [DUKE (H. Lyndhurst), Director].—11 pp. 1936. Entebbe. Govt. Printer. [Shs. 1/50.]

This report covers the last year of the life of the Human Trypanosomiasis Institute at Entebbe.

The year was spent in an attempt to complete certain lines of research, *viz.*, the conclusion of the investigation of the efficacy of Bayer 205 as a prophylactic against the trypanosomes of man; and a continuation of the study of antelope as a reservoir of these trypanosomes. All this work has already been published, and has received notice in this *Bulletin*. W. Yorke.

CONGO BELGE: RAPPORT SUR L'HYGIÈNE PUBLIQUE AU CONGO BELGE PENDANT L'ANNÉE 1934 [VAN HOOFF (L.)]. [Trypanosomiasis pp. 22-35. With 1 map.] [**Trypanosomiasis in the Belgian Congo during 1934.**]

Eight European cases of trypanosomiasis were discovered during 1934 as compared with 12 in 1933 and 7 in 1932. In a table information is given in respect of the years 1927 to 1934 of the number of natives examined, of the number of old cases seen and treated, of the number of new cases discovered, and of the index of new infection. During the year 1934, 3,824,097 patients were examined, 86,147 old cases were seen and treated, 24,101 new cases were discovered, and the index of new infection was 0.63 per cent.

In a series of tables information is given regarding the state of affairs in the different provinces. On the whole the situation appears to be satisfactory. There is a progressive lowering of the index of new infection. van Hoof, however, records a warning that it would be unwise to draw unduly optimistic conclusions. Experience has shown that although the initial work may rapidly reduce the new infection rate, constant work is necessary to maintain the position. If vigilance is relaxed because of too great confidence in the stability of the results obtained, the disease may suddenly flare up again with the intensity of an epidemic.

A good deal of detailed information regarding the incidence and progress of the disease in the various portions of the Belgian Congo is supplied in the report, which must be consulted in the original by those interested. W. Y.

DUPUY. La maladie du sommeil dans les régions soumises à l'action du fonds Reine Elisabeth pour l'assistance médicale aux indigènes du Congo Belge. [**Sleeping Sickness in the Regions dealt with by the Queen Elizabeth Funds for the Medical Assistance of the Natives of the Belgian Congo.**—*Ann. Soc. Belge de Méd. Trop.* 1936. Mar. 31. Vol. 16. No. 1. pp. 47–82.]

This report describes the sleeping sickness work of the Foreami during 1934 [this *Bulletin*, 1935, Vol. 32, p. 682]. During the course of the year 744,717 natives were examined, and 4,776 new cases of trypanosomiasis discovered; the contagious index for the year was therefore 0.618 per cent.

The number of old cases on 31st December, 1933, was 12,886, and of these 2,041 were put on treatment; in all 19,703 patients were treated during the year. The total endemic index was 2.55 per cent. as compared with 1.66 per cent. in 1933. The number of provisionally cured patients was 12,975 and the efficacy rate was accordingly 65.86 per cent. A number (469) of patients disappeared during treatment, 370 died and 5,889 patients remained on treatment at the end of the year, the maintained endemic index thus being 0.76 per cent.

Having summarized the total results in this manner, Dupuy passes to an analysis of the work done in the different parts of the Bas Congo and of the two subsectors of Kwango (Bas Kwango and Bas Kwilu). In a series of tables he gives for each of the 8 sectors of the Bas Congo the contagious index, the total endemicity, the treatment efficacy rate, and the maintained endemicity rate found during each of the last four years. The author comments upon these figures.

Writing on the subject of arsenic-resistance, Dupuy says that two forms are seen. The one is acquired early during the first course of treatment; and the other is acquired slowly, or is latent, and is seen in patients who have passed their "lumbar puncture of control" [*vide* this *Bulletin*, 1935, Vol. 32, p. 683]. The latter form is by far the more dangerous because it gives rise to contagious foci which remain unknown unless one is on the look out for them. The recognition of such a danger necessitated the re-examination of patients considered to be cured in 1931. In Ganda-Sundi where 37 new cases were discovered in 1934 among 38,000 natives, systematic examination of the old cases enabled VAN DAELE to find 9 infected persons among those declared to be cured in 1931. MARSAN and ROSSI found respectively 3 cases and 12 cases belonging to the same category. The hypothesis that these old cases have been reinfected is considered and dismissed for what appear to be good reasons.

Four of the 7 foci of arsenic-treatment infections discovered in 1933 still exist. In Ganda-Sundi there were 13 cases, of which 9 were latent arsenic-resistant cases; in 1933 there were 36 cases. In Tshela-Est there were 4 cases, in one of which the resistance was acquired early; the other 3 were cases considered to be cured in 1931; in 1933 there were 35 cases. In Cataractes-Nord there were 7 primary cases of arsenic-resistance and 2 latent cases as compared with 11 cases in 1933. In Bangu there were 5 primary cases and 8 cases in which the resistance was acquired early as compared with 18 cases in 1933.

Two sub-sectors still show arsenic-resistant cases; in Seke-Banza there were two cases in which the resistance was acquired early, and in

Bas Fleuve there were 12 latent resistant infections. Arsenic-resistance is no longer found in Sengololo or in Lufimi-Basse-Sele. The total number of resistant cases found in 1934 was 53 as against 121 in 1933. It is remarked that the evolution of the disease in cases of arsenic-resistance, whether primary or acquired early in treatment, is very severe; of the 180 resistant cases recorded since 1931 in the archives of Tshele-Est, 78 cases are not cured but under control, 51 are still under treatment, and 51 are dead.

Dupuy then passes on to a discussion of methods of diagnosis and of treatment. The drugs favoured are moranyl and trypanarsyl. Arsenic-resistant cases are given a combined treatment of one or two doses of moranyl, followed by a number of massive doses of trypanarsyl, and sometimes by tartar emetic. It is noted that the massive doses of trypanarsyl (up to 4.5 gm.) are only given after a previous injection of sodium hyposulphite.

The paper closes with an account of the way in which treatment is controlled by lumbar puncture. These punctures are performed for various purposes and are designated "punctures for diagnosis," "punctures for elimination," "punctures for control," etc. The purposes for which these are made are discussed in the previous year's report [this *Bulletin*, 1935, Vol. 32, p. 683], and need not be mentioned again. It is recorded that no less than 33,317 lumbar punctures were made during 1934: the results obtained are analysed in tables.

W. Y.

- i. HOARE (Cecil A.). **Morphological and Taxonomic Studies on Mammalian Trypanosomes. I. The Method of Reproduction in its Bearing upon Classification, with Special Reference to the *Lewisi* Group.**—*Parasitology*. 1936. Jan. Vol. 28. No. 1. pp. 98–109. With 1 fig. [18 refs.]
- ii. ——. **Morphological and Taxonomic Studies on Mammalian Trypanosomes. II. *Trypanosoma simiae* and Acute Porcine Trypanosomiasis in Tropical Africa.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Apr. 8. Vol. 29. No. 6. pp. 619–645. With 1 map & 2 figs. [43 refs.]

i. This paper is devoted to a critical analysis and revision of the systematics of the mammalian trypanosomes. The fact that the classification of trypanosomes has always been controversial is due mainly to lack of agreement in the choice of criteria for the identification and differentiation of the vast number of the parasites which are at present known; they are distributed among a multiplicity of hosts, and although they differ but slightly in morphology they vary considerably in their effect upon their hosts.

Practically all the known trypanosomes are referred to the genus *Trypanosoma* Gruby, 1843, with the exception of one constituting the genus *Endotrypanum* Mesnil and Brimont, 1908, and one or two others placed in the genus *Schizotrypanum* Chagas, 1909. Nothing can be said at present regarding the position of *Endotrypanum*, which is a *genus enquirendum*, its sole representative, *E. schaudinni*, requiring further investigation.

The position of *Schizotrypanum* is considered in great detail, and the author reaches the conclusion that there is no doubt that both *T. cruzi* and *S. pipistrelli* belong to the *lewisi* group of the genus *Trypanosoma* as defined in the system of HOARE & COUTELEN (1933), with additional

characteristics provided in the present paper. In his present classification HOARE divides the trypanosomes into two sections, each with distinct morphological and biological characteristics. In the section corresponding to the *lewisi* group the method of reproduction is used as a criterion for the specific differentiation of the trypanosomes.

The following is the classification :—

Family Trypanosomidae.

Genera Trypanosoma.

Definition : Flagellates which, in the course of their development in the vertebrate and invertebrate hosts, pass through the leishmanial, leptomonad, crithidial and trypanosome stages, attaining the highest degree of morphological complexity within the family.

SECTION A.

Morphology of trypanosomes in vertebrate host :

Kinetonucleus not terminal. Posterior end of the body drawn out and pointed. Division typically in the crithidial and leishmanial stages (exceptionally in the trypanosome stage).

Biological characteristics :

Multiplication discontinuous in the vertebrate host. Cyclical development in the intermediate host ; infective forms (metacyclic trypanosomes) produced in hind-gut (posterior station). Transmission contaminative (through faeces). Trypanosome slightly or not pathogenic ; easily culturable.

Lewisi group :

Reproduction by equal binary fission in the crithidial stage : *T. pipistrelli* (= *T. vespertilionis* ?).

Reproduction primarily by equal multiple fission and secondarily by binary fission in the crithidial stage : *T. rabinowitschi* (= *T. criceti*).

Reproduction primarily by unequal multiple fission and secondarily by binary fission in the crithidial stage (occasionally division in the trypanosome stage) : *T. lewisi*, *T. duttoni*, *T. primum* ?

Reproduction primarily by binary fission in the leishmanial stage and secondarily in the crithidial stage (occasionally division in the trypanosome stage) : *T. cruzi*, *T. theileri* ?

Trypanosomes the method of reproduction of which is insufficiently known : *T. melophagium*, *T. theodori* and various other trypanosomes of rodents, insectivores, carnivores, etc.

SECTION B.

Morphology of trypanosomes in vertebrate host :

Kinetonucleus terminal or sub-terminal. Posterior end of the body blunt. Division typically in the trypanosome stage.

Biological characteristics :

Multiplication continuous in the vertebrate host. Cyclical development in the intermediate host ; infective forms (metacyclic trypanosomes) produced in the proboscis or salivary glands (anterior station). [Except in the *evansi* group in which there is no cyclical development.]

Transmission inoculative (through the bite). (Except in *T. equiperdum*.)

Trypanosomes pathogenic, not easily culturable.

Evansi group : *T. evansi*, *T. equinum*, *T. equiperdum*, etc.

Vivax group : *T. vivax*, *T. caprae*, *T. uniforme*.

Congolense group : *T. congolense*, *T. simiae*.

Brucei group : *T. brucei*, *T. rhodesiense*, *T. gambiense*.

ii. This paper deals with the aetiology of an acute form of trypanosomiasis among pigs in tropical Africa. Study of the parasites from a number of cases showed that they all represent a polymorphic trypanosome of the same type, e.g., *T. simiae* Bruce *et al.*, 1912. The following revised description of the parasite is given :—

Nomenclature :

Trypanosoma simiae Bruce *et al.*, 1912.

Synonyms : *T. ignotum* Kinghorn and Yorke, 1912.

Duttonella simiae (Chalmers, 1918).

T. rodhaini Walravens, 1924.

T. porci Schwetz, 1932.

[*T. congolense porci*] Schwetz, 1934.

T. suis Ochmann, 1905 ; Mayer, 1912.

Morphology in Vertebrate Host.—Polymorphic trypanosome, comprising (1) elongated stout forms with well-developed undulating membrane (ca. 90 per cent.), (2) elongated slender forms with slight undulating membrane (ca. 7 per cent.), and (3) short (*congolense*-like) forms (ca. 3 per cent.). The great majority of trypanosomes have no free flagellum ; it is probably present in 1.2 to 3.9 per cent. (only in elongated forms). Kinetonucleus typically subterminal and marginal. Dimensions : total length (body + flagellum) from 12 μ to 24 μ , mean length from 17 μ to 18 μ . Binary fission markedly asymmetrical ("stepped"). (Note : characteristic "head-to-tail" agglutination in pairs).

Biological characteristics.—Intermediate hosts : tsetse flies (*Glossina morsitans* and possibly other spp.) ; development in intestine and proboscis (metacyclic trypanosomes). Pathogenicity : highly virulent to pigs and sometimes to monkeys ; slightly virulent to goats and sheep ; not infective to cattle, antelope, dogs and laboratory rodents.

Habitat.—Vertebrate hosts : warthog (*Phacochoerus aethiopicus*) (reservoir) and domestic pig (*Sus scrofa*) (Suidae).

Geographical distribution : Tropical Africa, mainly Central and Eastern."

It is shown that *T. simiae* has affinities both with members of the *congolense* group and with those of the *brucei* group, and that it occupies an intermediate position. An account is given of all the known instances of acute pig trypanosomiasis. W. Y.

CORSON (J. F.). **A Note on Hyrax and Dikdiks (*Rhynchotragus*) from Areas inhabited by Tsetse Flies.**—*Jl. Trop. Med. & Hyg.* 1936. June 15. Vol. 39. No. 12. p. 138.

Hyrax and dikdiks obtained from tsetse-free districts are known to be very susceptible to infection with *T. rhodesiense*, yet they are plentiful in places where tsetse are fairly numerous and also in sleeping sickness areas. The question arises whether these animals have acquired some resistance to infection or whether their existence in fly country depends on less exposure to infection than there seems to be.

During August, 1934, 42 Hyrax were caught in an area where *G. swynnertoni* was plentiful and trypanosomiasis among stock was troublesome, but sleeping sickness unknown. They were taken to Tinde and thick blood films were made and a white rat inoculated from each. Then in most cases the Hyrax was inoculated with the blood of a rat infected with *T. rhodesiense*. None of the blood films showed trypanosomes and none of the inoculated rats became infected. All the 29 Hyrax which lived long enough became infected. The cerebrospinal fluid of some of them showed a large number of white cells, and trypanosomes were seen in two cases.

In March and April, 1936, 42 more Hyrax were caught in the vicinity of a sleeping sickness settlement at Uyogo in the Kahama district, where *G. morsitans* was plentiful. These animals were examined and treated in exactly the same way as the previous batch, and the results were exactly the same.

The experiments on the dikdiks were similar, but on a much smaller scale, only 6 animals being used. The general conclusion is that Hyrax are probably less exposed to the bites of tsetse than casual observations of their habits would suggest.

W. Y.

ADAMS (A. R. D.). **Trypanosomiasis of Stock in Mauritius. II.—Observations on the Incidence and Distribution of Trypanosomiasis in Cattle.**—*Ann. Trop. Med. & Parasit.* 1935. Dec. 18. Vol. 29. No. 4. pp. 475–481. With 1 map.

In 1935 the author drew attention to the fact that in addition to classical surra there existed in Mauritius a second trypanosomal disease of stock due to *T. vivax*. Since this discovery particular attention has been paid to the specific diagnosis of all trypanosomes found in domestic stock, and the present paper records the findings during the past year in respect of the incidence and distribution of these parasites in cattle.

Single blood films were then taken from the ears of local cattle selected at random from the indigenous bovine population. During the period May 1 to July 31, 1935, some 2,170 cattle were examined in this way. Of these 2.03 per cent. were found to be infected with *T. vivax* and 0.74 per cent with *T. evansi*. *T. theileri* was also recovered from several beasts. During the survey several species of filariae were observed; *Babesia mutans* and *B. bigemina* were also seen, and in a single case *Sarcocystis meischeriana* was found in a film.

Reasons are given for believing that the figure obtained for the incidence of *T. vivax* must be very much inferior to the true figure; *T. vivax* retires from the peripheral blood of cattle for weeks or months, to reappear for a few days, and again to disappear for prolonged periods.

The places in which cattle and equines infected with *T. vivax* and *T. evansi* were found are shown in a map. At first sight it would appear that while *T. evansi* has been found relatively evenly distributed throughout the island, *T. vivax* is absent from the eastern side and the south-western portion of the colony. This apparent difference in the distributions of the two parasites is explicable on two grounds. The high road with good surface roughly follows the main railway line and along it are situated the chief residential districts. The veterinary inspectors travelled on duty by rail, motor bus or cycle, and on inquiry it was found that, as was to be expected, the areas covered by them were chiefly in close proximity to the available means of rapid transport. The more inaccessible estates and villages were rarely visited. The other reason is that *T. vivax* infection in cattle did not cause the same severe and sudden disability as *T. evansi*, and consequently was not reported from all parts of the country as was the latter infection.

From a study of available data, and of the incidence and distribution of *T. vivax* at the present day, the conclusion is reached that this trypanosome may have been present in the Colony for many years. It is possible that it was present before surra was introduced in 1901.

W. Y.

SYMES (C. B.). **Outline of Work on *G. palpalis* in Kenya.**—*East African Med. Jl.* 1935. Dec. Vol. 12. No. 9. pp. 263–281. With 1 map. [17 refs.]

After giving a brief account of the history of sleeping sickness in Kenya, the author passes to a consideration of the present position. A map is given indicating the present distribution of tsetse fly. Many square miles of these fly-infested areas remain unoccupied by human beings. Very large areas of fertile shore and river lands lie derelict, the descendants of previous occupants of these lands maintain a miserable existence behind belts of tsetse-infested bush or mosquito-producing papyrus swamps. The lake, which should be the life and soul of all native communities within many miles of its shores, is inaccessible to the majority and a menace to the few more reckless spirits who do make use of it. The control of *G. palpalis* is, therefore, essential for the greatest of economic reasons; and whilst tsetse and infection both exist there is also the risk of more epidemics.

The next portion of the paper is concerned with the habits of *G. palpalis* in Kenya, which, Symes says, appear to differ in some ways from those of *G. palpalis* of the text books. Its breeding habits are particularly unorthodox. In Kenya very few typical breeding areas (e.g., the base of rocks and trees, and under fallen logs) were found. Pupae occurred almost everywhere, in the bush, along the lake shore and river. They were discovered in relatively large numbers under a thick layer of fig leaves, with nothing but the branches of the fig tree 15 feet above the ground.

The general conclusion from this work was that it seemed impracticable to eradicate *G. palpalis* in such areas by abolishing its breeding grounds, unless by this is meant practically all the bush. Trapping experiments are being continued in three areas. Scents made from the glands of certain animals improve trapping results. It was found that *G. brevipalpis* was present in the *palpalis* bush in greater numbers than had been supposed.

The paper closes with an outline of the field trials of the "block method" of attack on *G. palpalis*, which is being financed by the Colonial Development Fund.

W. Y.

CORSON (J. F.). **Experimental Transmission of *Trypanosoma rhodesiense* by *Glossina morsitans* from Man to Sheep and Back to Man.**—*Jl. Trop. Med. & Hyg.* 1936. June 1. Vol. 39. No. 11. pp. 125–126.

An account is given of a very interesting experiment in which *T. rhodesiense* was passed from man to a sheep by means of *G. morsitans* and then after having been transmitted through a series of six sheep by means of *G. morsitans* for a period of over a year, was passed back again to man. The scheme of transmission was as follows:—Patient (21.10.34) - fly - sheep (11.12.34) - fly - sheep - fly - sheep - fly - sheep - fly - sheep (30.12.35) - fly - man (2.3.36).

A fly infected on the sixth sheep was fed on the author's arm on 2nd March; on 5th March seven rats were inoculated with the author's blood, but none became infected. Fever appeared on the 8th March, and although no trypanosomes could be found on microscopic examination of the blood, six more rats were inoculated and all became infected. Trypanosomes were found in films of the author's blood the

following day. A reaction occurred at the place of the bite on 7th March, the fifth day after the bite, and rapidly developed into a well-marked area of erythema about 2 inches across, with a darker slightly swollen and tender centre. It gradually faded and had disappeared by 17th March.

Corson considers that the local skin reaction is a useful indication of infection in persons with light skins. Its intensity depends upon the number of trypanosomes injected; in one case when a momentary bite of a known infective fly on the finger-tip caused infection in 26 days no local reaction was seen.

This experiment supports the general opinion recently confirmed by DUKE [see below p. 657] that attacks of Rhodesian sleeping sickness treated with Bayer 205 confer no lasting immunity. This is Corson's fourth infection within 10 years, the last one being on 1st November, 1934, and 5 gm. of Bayer 205 were given between 1st November and 16th November, 1934. W. Y.

DUKE (H. Lyndhurst). **On the Power of *Glossina morsitans* and *Glossina palpalis* to transmit the Trypanosomes of the *Brucei* Group.**—*Ann. Trop. Med. & Parasit.* 1936. Apr. 8. Vol. 30. No. 1. pp. 37–38.

In a previous paper [this *Bulletin*, 1934, Vol. 31, p. 564] Duke reached the conclusion that *G. morsitans* is a more efficient vector of trypanosomes of the polymorphic group than is *G. palpalis*.

Owing to the fact that during the last year further supplies of *G. morsitans* pupae had been obtained from Tanganyika, it has been possible to extend work on these lines.

The infecting animals were monkeys, each infected with one or several strains of *T. gambiense* and *T. rhodesiense*, all of which were known to be transmissible by tsetse. Flies dying before the 10th day after the first feed were disregarded. Of 2,091 *G. morsitans* dissected 80 (3.83 per cent.) contained flagellates, whilst of 2,854 *G. palpalis* dissected 70 (2.45 per cent.) contained flagellates.

This additional evidence confirms the conclusion drawn from the earlier investigations, viz., that *G. morsitans* is better able to transmit trypanosomes of the *brucei* group than is *G. palpalis*. W. Y.

VAN DEN BRANDEN (F.). Nouvelle contribution à l'étude de la transmission héréditaire du trypanosome. [New Contribution to the Study of the Hereditary Transmission of Trypanosomes.]—*Ann. Soc. Belge de Méd. Trop.* 1935. Dec. 31. Vol. 15. No. 4. p. 567.

A white rat infected with *T. brucei* gave birth to four young ones. Microscopic examination of the blood of the young rats did not reveal trypanosomes, but inoculation of their blood into a healthy rat caused infection. The author claims that he has thus demonstrated experimentally the hereditary transmission of *T. brucei* in the white rat.

W. Y.

DUKE (H. Lyndhurst) & MELLANBY (Kenneth). **A Note on the Infectivity of *Trypanosoma rhodesiense* in the Crop of *Glossina palpalis*.**—*Ann. Trop. Med. & Parasit.* 1936. Apr. 8. Vol. 30. No. 1. p. 39.

Many years ago, ROBERTSON [this *Bulletin*, 1913, Vol. 2, p. 242], in a paper on the development of *T. gambiense* in *G. palpalis*, drew attention

to the fact that in some cases blood may be retained in the crop of the fly unmixed and apparently unaltered for 10 days or more, although frequent feeds have intervened.

As similar observations have from time to time been made by Duke, it was decided to find out whether the trypanosomes in the crop were infective on inoculation into sensitive animals. The results of three experiments of this sort were negative, and it is concluded that the brief sojourn in the fly at about 24°C. suffices to cause the trypanosomes to lose their infectivity.

W. Y.

ROUBAUD (E.) & COLAS-BELCOUR (J.). Essai de transmission de *Tryp. gambiense* par *Gl. palpalis* à l'Institut Pasteur de Paris. [Attempt to transmit *T. gambiense* by *G. palpalis* at the Institute Pasteur, Paris.]—*Bull. Soc. Path. Exot.* 1936. May 13. Vol. 29. No. 5. pp. 500-504. With 1 fig.

The flies used in this experiment were hatched from pupae sent from Entebbe. In all 100 flies were fed on the 3rd, 4th and 6th of January, 1936, on a guineapig infected with *T. gambiense*: the strain was isolated in 1934 from a case of sleeping sickness in the Cameroons. The flies were kept at about 28°C. by day and at about 35°C. by night, and the atmosphere was kept moist by dishes of water. After the infecting meals the flies were fed on a series of guineapigs up to 26th February. None of the guineapigs became infected.

The mortality among the flies was not excessive and the authors state that it was possible to keep a large number alive beyond the period necessary for the complete development of the trypanosome in the fly. All flies living 10 days or more after the infecting meals were dissected; of the 51 so examined only one was found to be infected. The trypanosomes were limited to the gut and proventriculus. A description is given of the types of trypanosomes found; they correspond to those previously described and figured by BRUCE, ROBERTSON and others.

W. Y.

LLOYD (H. M.). Notes on the Bionomics of *Glossina swynnertoni*, Austen.—*Bull. Entom. Res.* 1935. Dec. Vol. 26. Pt. 4. pp. 439-468. With 5 figs. [10 refs.]

The observations and experiments upon which this paper is based were made in Shinyanga, Tanganyika Territory, from December 1930 to July 1932. Their subject, *G. swynnertoni*, an important vector of both human and animal trypanosomiasis, was, prior to the commencement of reclamation, rapidly extending its area in the Shinyanga district and forcing the native inhabitants to retire.

A description is given of the four main types of vegetation communities infested by this fly round Shinyanga; in each type game in moderate amount, and therefore food, is present throughout the year. While most common in "hard pan" (valleys where the surface soil lies just above beds of "an impervious limey concrete" or pseudo-laterite rock), *G. swynnertoni* is much less abundant in country in which the dominant tree is *Commiphora fischeri*; scarce in open acacia savannah; and of still less frequent occurrence in open plains. This species of tsetse breeds mainly in thickets, but its "pupae are also found under decumbent logs, overhanging rocks and in hollows at the bases of trees." As regards seasonal prevalence, "*G. swynnertoni* is commonest during

the first month or two of the dry season," becomes less numerous with the advance of the latter, and sinks to its lowest level during the short rains. An increase occurs in the short dry season (in January or February) following the short rains, and thenceforward, throughout the long rains, numbers show little alteration. Owing to the presence of game, "concentrations remain in the hard pan areas throughout the dry season."

Experiments showed that a clearing 800 yards wide is not an absolute barrier to *G. swynnertoni*, which, like *G. morsitans*, "appears to find food by sight rather than by scent." Flies that cross such a clearing are mostly hungry, and it is believed they are searching for food. The hungrier the fly the more persistently does it follow man, and in this respect males exhibit more pertinacity than females. Catching *G. swynnertoni* by hand from screens, in a block of country some 15 square miles in extent during a period of sixteen months, reduced its numbers but did not exterminate the fly. The failure of the experiment in the latter respect is ascribed by the author to the insufficient width of the isolating clearings, and also to the fact that female flies show themselves to catchers less frequently than males, "so that breeding is able to continue." In the first months of the experiment the catch was predominantly male; subsequently "A very large rise in female percentage occurred."

E. E. Austen.

- i. LAMBORN (W. A.) & HOWAT (C. H.). **A Possible Reservoir Host of *Trypanosoma rhodesiense*.**—*Brit. Med. J.* 1936. June 6. pp. 1153-1155.
- ii. DAVEY (J. B.). **Trypanosomiasis.** [Correspondence.]—*Ibid.* June 27. pp. 1321-1322.

i. Details are given of a Nyasaland native infected with *T. rhodesiense*, but showing no signs of the disease.

The patient was admitted to hospital at Fort Johnston on 16th June, 1935, suffering from urinary schistosomiasis and ankylostomiasis. On examination of his blood polymorphic trypanosomes (*T. rhodesiense*) were found. The native has been kept under observation for over 6 months, and apart from an improvement in his general health as a result of treatment of the hookworm and bilharzia, the condition remains unchanged. Except for rises of temperature on two occasions the course has been afebrile; he is content to remain in hospital and weaves mats, the intricate nature of this work indicating that his muscular co-ordination is unimpaired.

The blood has been examined at weekly intervals and the number of trypanosomes found per 100 leucocytes is given in a chart. Once every month the condition of the cerebrospinal fluid and of the lymph has been investigated, but without pathological findings. The trypanosome was transmitted to dogs and rats by the syringe and by the fly; it produced in these animals an acute disease.

The authors state that it is apparent that this patient is either passing through a latent stage in the course of active trypanosomiasis or else that he is a carrier of the disease. Since the patient has so long remained able-bodied, and since he resides in an area infested with *G. morsitans*, it is evident that any flies which might have bitten him could well have passed on the infection to others, and that in this way could have been started an epidemic comparable to those which have been traceable to one infected person. The history of the first outbreak

of sleeping sickness in Nyasaland is particularly instructive in this respect, and is referred to in some detail.

From the sleeping sickness diaries, it appears that [Dr. J. B. Davey in 1908 diagnosed the first case of sleeping sickness found in the Protectorate in a native at Nkata Bay, who had accompanied a European to Tanganyika and the Congo. The native returned to Nyasaland from Cape Town by steamer. Davey records that the patient was in good health, the glands were not greatly enlarged and examinations of the blood were negative, and that the native had been back in his village, in a fly-free area, for one year, during which time he had made no complaint of ill health.

The patient was removed and segregated near Dowa about 130 miles south. His removal in a condition comparable to that of the native, who is the subject of the present communication, and the want of proper care to shield him from fly, appears to have been responsible for the epidemic of sleeping sickness which followed in the Dowa district.

The conclusions are as follows :—

" This case may well afford an affirmative answer to the question : Can *T. brucei*, occurring in areas where human trypanosomiasis is unknown, infect man? Its importance lies in the fact that the spread of sleeping sickness is, in all probability, mainly due to the movements of human carriers of a strain of trypanosome which, while not immediately pathogenic, may become so after more than one passage through man.

" It emphasises the need for examination of the whole population when sleeping sickness arises apparently *de novo*. The investigation should include the examination of the blood of even the apparently healthy and of material obtained by puncture of the lymph glands."

ii. Davey, referring to Lamborn and Howat's paper, states that if, as these authors believe, the trypanosome on first transfer to man from game, *via* the fly, establishes itself in its new host with difficulty, and even then is only mildly pathogenic, we have an explanation of the escape from infection of large numbers of persons bitten by infected flies. There still, however, seems to be a hiatus between the discovery of a carrier by Lamborn and Howat and the usual acute course of infection. Surely one passage through man does not so intensify the pathogenicity of *T. brucei* to man that it becomes capable of causing death in 100 per cent. of untreated cases within 4 months. Davey suggests that this hiatus does not, in fact, exist. He refers to two cases reported by the Medical Officer in charge of sleeping sickness investigations, 1917, which long survived the usual 4 months' duration of the disease. There are indeed good grounds for believing that one of them actually recovered, and the other showed no signs of disease 8½ months after a diagnosis had been made. Davey agrees with Lamborn and Howat that the human carrier is the danger. If infection of man may arise in any area where *G. morsitans* and game harbouring *T. brucei* exist, as recent knowledge of the disease suggests, Davey enquires whether the time is not ripe for reconsidering the conclusions to which the Royal Society's Commission to Nyasaland came. One of these reads :

" It is self-evident that these wild animals should not be allowed to live in 'fly-country,' where they constitute a standing danger to the native inhabitants and the domestic animals. It would be as reasonable to allow mad dogs to live and be protected by law in our English towns and villages. Not only should all game laws restricting their destruction in 'fly-country' be removed, but active measures should be taken for their early and complete blotting out."

W. Y.

SICÉ (A.), ROBIN (Ch.) & MERCIER (H.). *Forme évolutive atténuée de la trypanosomiase humaine ; ses rapports avec un trypanosome de moindre virulence. [Attenuated Form of Human Trypanosomiasis ; its Relationship with a Trypanosome of Slight Virulence.]*—*Marseille-Méd.* 1936. Mar. 15. Vol. 73. No. 8. pp. 345-351. With 1 fig.

The authors have studied the morphology of a trypanosome isolated from a very chronic case of human trypanosomiasis.

The history of the patient is given in considerable detail. He left the Ivory Coast for France in July, 1934, apparently in a state of perfect health, and remained well until April, 1935, when he was admitted to hospital with pain in the legs, a bilateral oedema, general adenitis and tachycardia. Trypanosomes were found on gland puncture. Lumbar puncture showed slight alterations in the spinal fluid, the cells being 24 per cmm. and the protein 0.30 per 1,000.

After some difficulty a guineapig was infected with the trypanosome, and then the strain was transmitted through a series of guineapigs. Attempts to infect mice failed. The authors remark upon the long incubation period, the prolonged infection and the absence of abortion in the infected guineapigs. They state that by observing daily the evolution of the trypanosomes in the infected animals they have been able to follow the adaptation of the parasite for the organism of the guineapigs.

The trypanosome at the beginning was remarkably polymorphic and it still retains the character, but to a less degree. The multiplication of the trypanosome did not appear to the author to be particularly active, but it exhibited interesting characters. Some forms were noted in which the nucleus had divided, and one nucleus was near the undivided blepharoplast and the other at the junction of the middle and posterior thirds of the body.

The authors write that the trypanosome in the course of its adaptation to the guineapig presented most of the various characters exhibited by *T. rhodesiense*, e.g., marked polymorphism and posterior-nuclear forms. These points are illustrated in a text-figure. The patient, however, suffered from a chronic disease and came from a region, the Ivory Coast, where Rhodesian sleeping sickness is unknown. W. Y.

MOUSTARDIER (G.). A propos d'un cas de méningo-encéphalite trypanosomique chez un Sénégalais à Tananarive. [**A Case of Trypanosomal Meningo-Encephalitis in a Senegalese at Antananarivo.**]*—Bull. Soc. Path. Exot.* 1936. Apr. 1. Vol. 29. No. 4. pp. 435-442.

The patient was a native of the Ivory Coast who enlisted for 4 years in February, 1929. He served for 3 years in Senegal and was repatriated eventually to the Ivory Coast. In February, 1933, he re-enlisted for a further period of 4 years and left Africa on August 31, 1933, for France whence he was sent to Madagascar where he arrived on October 26, 1933. The patient was admitted to hospital at Antananarivo owing to an epileptiform attack in August, 1935. The findings and subsequent history of the case are given in great detail.

The case turned out to be one of trypanosomal meningo-encephalitis in an advanced stage. Spinal puncture revealed trypanosomes, lymphocytosis and an excess of globulin. The date of infection is

unknown, but it could not be later than August, 1933, when he left West Africa for France. The disease advanced insidiously for two years without producing general symptoms; there were no febrile disturbances, no emaciation and no somnolence. W. Y.

VAN BOGAERT (Ludo). Présence de lésions myéliniques dans la trypanosomiase expérimentale. [**Presence of Myelin Lesions in Experimental Trypanosomiasis.**—*C. R. Soc. Biol.* 1936. Vol. 121. No. 13. p. 1387.

In a previous paper the author with BORREMANS drew attention to the occurrence in a case of human trypanosomiasis of a cystic degeneration of the subthalamic region and in the neighbourhood of the third ventricle. There was a micro-polycystic degeneration of the parenchyma involving the myelin fibres.

More recently the author has had the opportunity of examining the brain of a baboon (*Papio jubilaus*) infected experimentally with *T. gambiense*. He found definite involvement of the myelin of the centrum ovale and of the claustrum by foci irregularly distributed round the vessels. In addition to these juxta-vascular foci, there was a marked demyelination of the corona radiata, and particularly of the fibres which go to the corpus callosum. The myelin lesions were old, and the demyelinated areas were the seat of very manifest macro- and microglial proliferation. The myelin lesions were accompanied by very gross lesions of the axone. W. Y.

BOUVIER (G.). Le diagnostic microscopique des trypanosomiasés bovines en brousse. [**Microscopic Diagnosis of Trypanosomiasis in Cattle in the Bush.**—*Bull. Agric. Congo Belge.* 1936. Mar. Vol. 27. No. 1. pp. 65-69.

This paper describes the various methods of examining the blood of cattle for trypanosomes and contains nothing new. W. Y.

DUKE (H. Lyndhurst). **On the Prophylactic Action of "Bayer 205" against the Trypanosomes of Man. Concluding Observations.**—*Lancet.* 1936. Feb. 29. pp. 463-469. [12 refs.]

In this paper the author concludes his observations on the prophylactic action of Bayer 205 against human trypanosomiasis [this *Bulletin*, 1935, Vol. 32, p. 8].

Referring to his former paper, Duke writes that the use for the first time of native volunteers on a large scale involved difficulties that have since been largely overcome, and explained the inclusion in his first paper of the men of Group I, *i.e.*, infected cases treated with Bayer 205. There were, of course, objections to their employment, *i.e.*, the large amount of Bayer administered and the possible immunizing effect of the liberation of antigen following the destruction of trypanosomes by the first dose. The full extent of the protection conferred by the drug against *T. rhodesiense* was not determined, as no protective volunteers succumbed to that trypanosome.

In the course of the present investigations several of the volunteers after having been infected and treated were later on again exposed to infection. Details of this work are given in a table, from which it appears that any immunity conferred by a brief (10 to 15 days) infection

with *T. rhodesiense* or *T. gambiense*, followed by a course of six injections with Bayer 205 or tryparsamide, does not persist for as long as 6 to 16 months.

In the second table information is given regarding the observations made on 18 further volunteers. Nine received a single dose of 1 gm. of Bayer 205, five a single dose of 2 gm., and the other four 2 doses of 1 gm., separated by an interval of 21 days. All the injections were given intravenously. Of the nine who received 1 gm. of the drug four were infected at their first exposure, *viz.*, 92, 105, 92 and 73 days, respectively, after the administration of the drug. Two of the infections were *T. gambiense* and two *T. rhodesiense*. The remaining five were protected for 120, 123, 97, 190 and 327 days, respectively. Of the volunteers receiving 1 gm. + 1 gm. of Bayer 205, none were infected at their first exposure. Protection against *T. gambiense* lasted 169 and 187 days, and against *T. rhodesiense* 171, 206 and 164 days. None of those receiving 2 gm. of the drug were infected at their first exposure, and protection against *T. gambiense* lasted 128 and 153 days, and against *T. rhodesiense* 163, 103, 152, 180 and 179 days.

As a general rule when infection did ensue it developed normally. There were, however, certainly three, and possibly five, examples of delayed or "cryptic" infection, when the patient showed no apparent symptoms for two months and possibly longer. An infection of this kind may gradually generate typical symptoms, or it may become merged into a subsequent infection superimposed upon it and running a normal course.

The matter is discussed in considerable detail, and Duke reaches the conclusion that "cryptic" infection may arise independently in nature, apart altogether from the administration of any drug.

Consideration of one of the cases suggests that frequently repeated inoculations of living trypanosomes during the three or four months immediately following the administration of Bayer 205 lead to the establishment of a more prolonged immunity than that conferred by the drug alone without such frequent exposures to infection. Duke writes that if this be true, then the more intense the exposure in nature to infective tsetse, the greater the benefit derived from the prophylactic.

The general conclusion is that a dose of 2 gm. of Bayer 205 administered to an adult may be expected to confer protection against *T. gambiense* and *T. rhodesiense* for at least three months; and the protection may last longer.

W. Y.

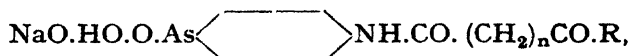
VICARS-HARRIS (N. H.). **The Occupation of Land reclaimed from the Tsetse Fly of Tanganyika.**—*East African Ann.* 1934-35. Nairobi. 6 pp. With 10 figs. [Summarized in *Rev. Applied Entom.* Ser. B. 1936. May. Vol. 24. Pt. 5. pp. 103-104.]

"A brief account is given of the land that has been reclaimed from *Glossina* in Tanganyika Territory, particularly in the Shinyanga district, and of the means adopted to induce permanent settlement by natives. Between 1923 and 1931 some 140 square miles of country had been reclaimed by the natives in Shinyanga under the guidance of the Government; between 1927 and 1932 some 80 square miles were reclaimed in Mwanza Province, and a smaller area in Nzega was cleared and closely settled. In the Mbulu District in the Northern Province, over 200 square miles was made available in 1931 by cutting corridors and throwing open hitherto inaccessible plains. A rather more

detailed account is given of the opening up of the Huruhuru plains for grazing and settlement. Unfortunately the corridor 1,200 yards wide leading to these plains was found to be too narrow for safety, as small numbers of flies were observed wandering into it and along the cattle track. Ultimately it is hoped to render free from fly an area three or four miles wide, but in the meantime cattle were successfully taken through by sending trained native assistants with catching screens ahead of each herd. Not many flies were caught. An area of 150 square miles has been opened up, and the sojourn of cattle in it during the first season has been a great success." ~

YORKE (Warrington) & MURGATROYD (F.) in collaboration with F. GLYN-HUGHES, H. M. O. LESTER & A. O. F. ROSS. **A New Arsenical for the Treatment of Syphilis and Trypanosomiasis.**—*Brit. Med. Jl.* 1936. May 23. pp. 1042-1048.

During the last seven or eight years, the authors have examined for the Chemotherapy Committee of the Medical Research Council the trypanocidal activity of numerous new compounds, including a long series of aromatic arsenicals of the general formula—



prepared in Professor MORGAN's Laboratory of the Department of Scientific and Industrial Research at Teddington. The initial steps in this investigation consisted in examining the trypanocidal activity of the compounds first in mice and later in rabbits infected with a standard trypanosomal infection, the response of which to old and well-tried drugs, such as atoxyl and tryparsamide, had been thoroughly investigated.

About half a dozen of these new compounds were found to have a therapeutic activity in trypanosome-infected mice at least equal to that of tryparsamide. One of the most active of these, "Neocryl," was selected for more extensive trial on larger animals, and eventually on man. This product, which is to be put on the market as "Crylarsan Brand of Neocryl," is sodium succinanilomethylamide-p-arsonate. It is a white crystalline substance readily soluble in water.

The drug was tried on a considerable number of patients suffering from various stages of syphilis and on a limited number of cases of Nigerian sleeping sickness. The portion of the paper relating to the trials on syphilis has been summarized in the *Bulletin of Hygiene* (1936, Vol. 11, p. 693) and does not require further notice here. The trials on Nigerian sleeping sickness were carried out by Dr. Lester, Deputy Director of the Tsetse Investigation in Nigeria. The results obtained are summarized in the following table :—

It is stated that " the stimulant action of a long course of treatment with the drug was very pronounced, and led to the same difficulty commonly met with in experimental work with tryparsamide. Patients felt so much better that they became tired of the prolonged treatment, and absconded before they had completed their course of injections. Of the first eight cases treated with neocryl five disappeared before the final examination of the cerebro-spinal fluid could be made. In every case patients showed very rapid clinical improvement, and thought themselves completely cured after they had had five or six injections.

TABLE IV.—Summary of Results Obtained in the Treatment of Cases of Nigerian Sleeping Sickness with a Single Course of Neoceryl.

Case No.	Duration of Symptoms	Condition at Commencement of Treatment					Treatment		Condition Immediately after Treatment		Remarks	
		Clinical	Blood Type.	Cerebro-spinal Fluid		Dates	Total Amount of Neoceryl Given	Clinical	Cerebro-spinal Fluid			
				Globulin	Cells				Globulin	Cells		
4808	3 months	Weakness, severe headache, sleeplessness at night, sleeping during day, adenitis	+	+	+	28	28/6/34 to 18/9/34	28 grams (2 gram doses)	Quite strong, no headache, sleeps well at night, not in daytime; adenitis gone, blood negative	+	219	
4821	2 "	Weakness, headache, loss of weight, somnolence, adenitis	+	—	+	238	7/7/34 to 24/9/34	27 grams (2 gram doses)	Quite strong, no headache, sleeps normally, put on weight; no adenitis, blood negative	Slight haze	39	
4810	1 year	Weakness, very severe headache, somnolence, dullness, slurring speech, emaciated	+	—	+	332	5/7/34 to 24/9/34	25 grams (2 gram doses)	Quite strong, no headache, sleeps normally, appears and looks perfectly normal; no adenitis, blood negative	—	1	
B.K.	6 months	Weakness, severe headache, somnolence, dullness, some adenitis, well nourished	+	—	Normal	Normal	26/6/34 to 9/8/34	15 grams (2 gram doses)	Quite strong, no headache, sleeps normally; no adenitis, blood negative			Abandoned 12/8/34
K.S.	1 month	Weakness, somnolence, slight adenitis	+	—	"	"	26/6/34 to 15/9/34	29 grams (2 gram doses)	Quite strong, sleeps normally; no adenitis, blood negative			Abandoned 15/9/34
A.G.	6 months	Weakness, headache, somnolence, dullness, loss of weight, some adenitis	+	+	+	42	30/6/34 to 28/8/34	19 grams (2 gram doses)	Quite strong, no headache, sleeps normally, blood and gland juice negative			Abandoned 24/8/34
M.D.	6 "	Headache, well nourished, adenitis	—	+	Normal	Normal	10/7/34 to 9/8/34	11 grams (2 gram doses)	No headache, feels quite well, blood and gland juice negative			Abandoned 12/8/34
K.G.	4 "	Weakness, severe headache, somnolence, some adenitis	—	+	+	128	10/7/34 to 26/9/34	29 grams (2 gram doses)	Stronger, no headache, no somnolence, able to do light work, blood and gland juice negative			Abandoned
S.J.	6 "	Weakness, headache, somnolence, dullness, adenitis; history of syphilis six years previously and "eye trouble" two months previously	+	+	+	70	9/8/35 to 30/4/35	31.5 grams (3 gram doses)	Quite strong, no somnolence, appears and feels perfectly normal; blood and gland juice negative	—	3	
1	3 "	Weakness, headache, fever, somnolence, dull, emaciated	+	+	+	296	?	28.5 grams (3 gram doses)	Improved, but still somnolent	+	350	
2	4 "	Weakness, headache, fever, emaciated	+	+	+	21	?	28.5 grams (3 gram doses)	Normal	—	0	

"Taken as a whole, the results were distinctly promising. No late cases were included in the series, but it is noteworthy that one very advanced case that had failed to react to full courses of tryparsamide, of Bayer 205, and of antrypol, for some reason or another improved markedly on being given a course of this new drug." W. Y.

KELLERSBERGER (E. R.). **African Sleeping Sickness : a Clinical Study.**—*Southern Med. J.* 1936. Mar. Vol. 29. No. 3. pp. 239–242. With 3 figs.

This paper gives an interesting summary of the author's work on the treatment of sleeping sickness at Bibanga in the Katanga Province of the Belgian Congo.

Since 1924, when the present small hospital was completed, over 40,000 patients have been seen, and about 11,000 (28 per cent.) of these had sleeping sickness. It is noted that most of the patients presented themselves voluntarily, and that about 75 per cent. were observed for two years or more, and some for as long as 5 or 10 years. The greatest number of cases discovered was 2,915 in the year 1927.

The patients were divided roughly into three groups. The first group comprises those in apparent good health with trypanosomes in the peripheral blood, with irregular fever and persistent headaches, and inability to do full work. The second group comprises cases which present definite clinical signs, such as adenitis, constant headaches and irregular fever, tremors, slow slurring speech, stupor, and slow mental response. Gland puncture in these cases usually revealed the presence of the parasite; and lumbar puncture often showed increased pressure, excessive globulin and lymphocytosis. No less than 75 per cent. of the patients fell into this group. The last group comprises all advanced cases, with varied symptoms, such as somnolence amounting almost to coma, incoordination of movements, occasional involuntary defecation and urination, and sometimes mild or violent insanity. This group contained 13 per cent. of the patients.

Atoxyl, antimony, germanin and tryparsamide were the four drugs used. Kellersberger states that a number of patients were cured with atoxyl, some of whom had been observed for over 7 years. The disadvantages of atoxyl are the danger of blindness, the need of prolonged treatment, consisting of repeated series of injections over several years, its uselessness in advanced cases, and the difficulty of persuading a native to submit to painful injections over a long period.

Antimony preparations were never used alone, but always in conjunction with tryparsamide, when there was concomitant schistosomiasis, or when tryparsamide alone did not appear to be efficient.

Bayer 205 was extensively used, over 4,000 injections being given intravenously in an average dose of 0.02 ggm. [gm. ?] per kilo. of body weight. Short courses of 3 or 4 injections cured early cases where the trypanosomes were essentially a blood parasite. All the cases of the second or third group, however, relapsed after temporary improvement, and then had to be treated with tryparsamide.

In the author's opinion, the most useful drug for all cases is tryparsamide. Since 1924, it has been the drug of choice in the Congo, and no less than 150,000 injections have been given by the native staff to 10,000 cases. To effect a cure the drug must be pressed to the limit of security. The average dose was 0.045 gm. per kilo.; anything in excess of this may cause blindness, especially in advanced cases. In

itinerant work in the bush, where it is difficult to control the patient, it is wiser to use small doses for longer periods, and consequently the itinerant personnel of the Belgian Government never exceeds a 2 gm. dose. Patients who weigh 70 kilos. or more received in the author's dispensary as much as 3 gm. or even 4 gm. per week with excellent results. It was found that a series of 15 injections weekly is préférable to the 8 or 9 given formerly, and in cases where the central nervous system is involved it is wiser to repeat the cure after a rest of from one to three months, depending upon the condition of the patient as judged by lumbar puncture and other examinations.

Tryparsamide, as a rule, cures cases of Group I, but it is in the more advanced cases that it is the most efficient of all drugs. Patients who were moribund and apparently hopelessly insane have been cured, and the results have been controlled in many cases for 6 or 7 years. Kellersberger states that he has considered as cured a patient who is in good clinical condition one year after treatment and with negative laboratory examinations. As many as 75 per cent. have been cured, and under ideal conditions it is possible to obtain an 80 or 90 per cent. cure.

W. Y.

VAN DEN BRANDEN (F.), APPELMANS (M.) & POTTIER (R.). La toxicité du tryponarsyl additionné d'hyposulfite sodique pour le parenchyme rénal. [**The Toxicity of Tryponarsyl with Sodium Hyposulphite for the Renal Parenchyma.**—*Ann. Soc. Belge de Méd. Trop.* 1936. Mar. 31. Vol. 16. No. 1. pp. 121-123.

For some time it has been considered advantageous to associate sodium hyposulphite with tryponarsyl in the treatment of sleeping sickness in the Congo; the sodium hyposulphite is believed to lessen the risk of visual disturbance resulting from the arsenical.

The authors have investigated the question whether sodium hyposulphite increases the general tolerance of the rabbit to tryponarsyl, and have reached the conclusion that it does not do so. In the second part of their work they examined particularly the kidneys of rabbits which had received various doses of tryparsamide alone, and of other rabbits which had received the same doses of this arsenical and, in addition, various doses of sodium hyposulphite. The kidneys of the rabbits which had been given tryparsamide alone (up to a dose of 1.25 gm. per kilo.) showed no pathological changes, whereas the kidneys of the rabbit which had been given 1.25 gm. of tryparsamide + 0.375 gm. of sodium hyposulphite per kilo. showed severe lesions. The conclusion is that sodium hyposulphite does not protect the renal epithelium from damage by tryparsamide, but, on the contrary, may increase the risk.

W. Y.

POTTIER (R.) & VAN DEN BRANDEN (F.). Contribution à l'étude toxicologique de la glyphenarsine (tryparsamide, tryponarsyl, novatoxyl, trypotan). [**Contribution to the Study on the Toxicity of Glyphenarsine (Tryparsamide, Tryponarsyl, Novatoxyl, Trypotan.)**—*Ann. Soc. Belge de Méd. Trop.* 1936. Mar. 31. Vol. 16. No. 1. pp. 105-107.

The substance of this paper has already been published elsewhere and noticed in this *Bulletin* [1936, Vol. 33, p. 201].

W. Y.

STEWART (J. L.). **Treatment of Trypanosomiasis by Tartar Emetic, Antimosan and "Surfen C" in the Gold Coast.**—*Jl. Comp. Path. & Therap.* 1935. Dec. 31. Vol. 48. Pt. 4. pp. 316-318.

A summary is given of the result of treating with antimony, and a new Bayer preparation "Surfen C," Gold Coast cattle suffering from trypanosomiasis.

The cattle of the Gold Coast differ from those of Nigeria. The latter are humped zebu, while the former belong to the West African Short-horn unhumped breed, which has a much higher resistance to trypanosomiasis than the zebu.

Details of the result of treating cattle belonging to both types are given. The treatment by "Surfen C" did not appear to be nearly as effective as that by tartar emetic and other antimony preparations, but "Surfen C" appeared to be useful after antimony treatment to prevent relapses. All the 85 cattle are alive, except two, which died from intercurrent infections. The zebu bullocks which relapsed are, however, in very bad condition, but the zebu cows and heifers treated by antimony appear to have made a complete recovery and are in excellent condition one or two years after treatment.

W. Y.

OESTERLIN (M.). **Zur Chemotherapie der Infektionskrankheiten. [On the Chemotherapy of Infectious Diseases.]**—*Ztschr. f. Hyg. u. Infektionskr.* 1936. May 14. Vol. 118. No. 3. pp. 263-306. With 1 fig. [66 refs.]

This long and rather technical paper must be consulted in the original by those interested. It is shown that chemotherapeutic action is dependent upon the optical activity of a substance, and that both antipodes behave very differently against trypanosomes, just as the capacity to dye animal or vegetable threads by the same substances differs.

A series of mice were given 20 mgm. of casein-atoxyl compound on 1st October, and nine days later were infected with *T. brucei*. On the 13th October the mice were treated with various doses of atoxyl, and it was found that 0.8 mgm. sufficed to produce a permanent cure. In mice which had not received the preliminary dose of casein-atoxyl compound the maximum dose of 4.0 mgm. of atoxyl failed to produce a complete cure. This means that the effective dose of atoxyl is reduced to 20 per cent. when, as the result of a preliminary treatment of the experimental animal, the corresponding antibody has been produced. The phenomenon is strictly specific; previous administration of casein-atoxyl does not reduce the curative dose of tryparsamide or spirocide.

The toxicological and direct-acting factor in the metal-free derivatives of acridin and chinolin is bound up with the fluorescence of these substances. The fluorescent emissions of these substances were spectrographically absorbed and the relationship between fluorescence and activity ascertained. The activity of substances is only developed when there is a firm anchoring to the parasite cell. As a result of this firm binding the optical properties are changed; the exciting radiation is turned in the visible direction and the fluorescent colour is altered. In a table the author gives details regarding the colour in neutral solution, the fluorescence in neutral solution, the fluorescence in solution pH 6, the fluorescence in the trypanosome in ultra violet and in white light, and the trypanocidal activity in respect of 23 acridin and chinolin

derivatives. It is noted that the fluorescence seen in the trypanosomes can be approached *in vitro* by adjusting the pH.

Fluorescent substances, such as rivanol, which possess no binding groups are inactive. It is suggested that in the trypanocidal acridin and chinolin the pentavalent nitrogen serves as the haptophore groups; rivanol, when changed into rivanol-methylsulphate, becomes trypanocidal.

Chemotherapeutic interference is not a biological but a pure physico-chemical phenomenon due to the occupation of the trypanosome receptors by feebly or completely inactive products, thus preventing the specific binding of active substances.

Experiments on interference have produced evidence that all such substances as the arsinic acids, chinolin and acridin compounds are anchored by the same constituents of the trypanosome cell. W. Y.

SAZERAC (R.) & LARTHE (N.). Action de certains dérivés du cuivre sur le *Treponema cuniculi* et le *Trypanosoma brucei*. [The Action of Certain Derivatives of Copper on *Treponema cuniculi* and *Trypanosoma brucei*.]—C. R. Soc. Biol. 1935. Vol. 120. No. 40. pp. 1179-1181.

Copper oxide and hyposulphite were tried on rabbits infected with *Trep. cuniculi*. The former, which was given subcutaneously in oily suspensions, produced immediate benefit, but relapse followed; the latter given intravenously gave better results, and definite cures were obtained with two injections of about 14 mgm. per kilo.

Perla (1934) has shown that copper sulphate given by the mouth for 12 days protects to some extent rats against subsequent infection with *T. lewisi* or *T. equiperdum*. The authors examined the action of oily suspensions of copper protoxide in rats infected with *T. brucei*. It was found that a dose of 20 mgm. per 100 gm. sufficed to clear the circulation temporarily. A pseudo-colloidal solution of copper (electrocuprol) likewise exerted a definite temporary action, as also did copper sulphate.

W. Y.

SCHILLING (Claus) with H. SCHRECK, H. NEUMANN & H. KUNERT. Versuche zur Schutzimpfung gegen Tsetsekrankheit. III und IV Teile. [Experiments on Protective Inoculation against Tsetse Disease. Parts III and IV.]—Ztschr. f. Immunitätsf. u. Experim. Therap. 1936. Jan. 9 & Apr. 15. Vol. 87. Nos. 1/2 & 5/6. pp. 47-71; 482-518. With 19 figs. [12 refs.]

In these two lengthy papers the authors continue the account of their work on immunization against trypanosomes [this *Bulletin*, 1935, Vol. 32, p. 43 and p. 714, and 1936, Vol. 33, p. 195].

The third communication deals with the antigen properties of various trypanosome species and strains. In this work the authors employed, in addition to certain old strains collected between 1911 and 1914, various strains of *T. congolense*, *T. brucei* and *T. rhodesiense* of comparatively recent date. A list of these strains is given and information is also supplied regarding the manner in which they have been maintained. The antigenic property and the receptor (sensitivity to antibody) are two different attributes of the trypanosome cell. Experiments to illustrate the truth of this are given. From a strain of "Ferox" a serum-fast variety was obtained. Mice were infected with

the normal strain and then cured ; some were then inoculated with the homologous normal strain, and others with the serum-fast strain ; the former were refractory, but the latter became infected. When, however, mice were infected with the serum-fast strain and then cured they were found to be resistant to both the normal and the fast strain. This experiment shows that the serum-fast strain had the same antigenic qualities as the normal strain, but not the same receptors.

It was found that genuine strains of a trypanosome species obtained from several places in East Africa might behave similarly or differently in respect of their antigenic property and receptors. Such changes—loss of antigenic property or of receptors—may be produced in one of the following ways :—(a) during an infection—relapse strain formation ; (b) as the result of previous treatment with dry trypanosomes ; (c) as the result of the passage of the strain through *Glossina* ; and (d) by the transference of a strain from one species of animal to another.

When a second infection is superimposed on a first, the antibodies to the first infection may disappear from the serum and antibodies to the second infection may appear. Antibodies appear in different animals at very different times after infection ; in the foal Lottchen they appeared on the 126th day, in the foal Zeus on the 49th day, and in a rabbit on the 9th day.

In order to test the value of sera in respect of parasitocidal antibodies, the author always used the *in vivo* mice experiment as a standard. The serum, immediately after it was obtained, was always heated to 45°C. for 30 minutes to kill any trypanosomes it might contain. Sufficient trypanosomes were then added so that the suspension when examined microscopically showed not more than one trypanosome to a field ; 0.5 cc. of this suspension was then injected intraperitoneally into mice. If the suspensions contained substantially more trypanosomes the trypanocidal action was not manifest, or of 2 mice injected only one failed to become infected. Sometimes parallel *in vitro* observations were made, but these did not always agree with the *in vivo* results. The authors, however, did not succeed in establishing that there existed any real difference between the *in vitro* antibodies and the *in vivo* antibodies.

Discussing the question whether in trypanosomiasis a spontaneous sterilizing immunity ever occurs, the authors give details of two cases in which it seemed probable, but it is not possible to speak with certainty on this matter. [This should be compared with VAN SACEGHEM's findings, see below.]

It was found that the parasitocidal antibodies of the serum could pass from the mother to the offspring.

It is also noted that the strain of *T. brucei* "Hamburg alt," which in 1914 developed in *Glossina* without difficulty was no longer capable of doing so in 1933.

RONDONI and Schilling (1913) showed that a trypanosome suspension kept at 37°C. for some hours (which killed all the parasites) was toxic when injected into mice. In 1930 Schilling and Neumann repeated this work with the same strain of trypanosomes and failed to confirm the previous observation. It was found, however, that suspensions of a strain of *T. brucei* (maintained two years in mice), and kept at 37°C. for 18 hours was exceedingly toxic for mice.

The fourth communication deals more generally with trypanosome infections. It is difficult to follow closely the course of an infection in the larger experimental animals. When the number of trypanosomes

in the blood is small subinoculation into laboratory animals does not always result in infection. This is the basis of the method of immunization by minimal infection. A single cell infection with genuine trypanosome strains does not succeed; and the number of parasites injected by the bite of *Glossina* is not a matter of indifference. The species of trypanosomes (*T. brucei*, *T. congolense* and *T. vivax*) exhibit considerable differences in infectivity. An account is given of the characters of these parasites as seen in the vertebrate and invertebrate hosts, but it contains nothing new.

It was found that trypanosome infections in pregnant cows usually cause abortion; the infection did not pass to the foetus.

If an infected *Glossina* sticks its proboscis into the epidermis only, no infection results; infection does not occur unless the proboscis penetrates to the cutis and enters a blood vessel.

When cattle have a double infection with *T. brucei* and *T. congolense* one infection usually causes suppression of the other; in general *T. congolense* is the stronger. In such mixed infections *T. brucei* is the more easily eliminated by treatment. In double infections with *T. lewisi* and *T. congolense* the parasites exert no influence upon one another.

W. Y.

VAN SACEGHEM (René). L'immunisation des bovidés contre la trypanosomiase. [The Immunization of Cattle infected with Trypanosomiasis.]—*Bull. Agric. Congo Belge*. 1936. Mar. Vol. 27. No. 1. pp. 47-50.

The idea underlying the work described in this paper is that *T. congolense* inoculated into a young animal should give rise to a benign infection which confers immunity. It was found that when a calf 8 to 15 days old was inoculated with 2 to 5 cc. of the blood of a guinea-pig infected with *T. congolense*, the calf became infected, and after a few days exhibited numerous trypanosomes in the peripheral blood. When the infection was established the trypanosomes were found regularly in the blood; on certain days they were more numerous, and on others more scanty. After a period of 4 to 6 months, a stage was reached when trypanosomes were no longer found in the blood so regularly. Sometimes examination of the blood was positive and sometimes negative. The negative periods gradually lengthened, until, finally, a condition was reached when the trypanosomes could not be found, and the blood on inoculation no longer infected laboratory animals. Apparently, then, the animal had cured itself.

Re-inoculation of the cured calf with infected guineapig's blood failed to produce infection. The calf had hence acquired an immunity which was not due to a premunition, because trypanosomes no longer existed in the circulation. In a table details are given of 6 calves immunized in this way, and subsequently re-inoculated with infected guineapig's blood on 3 or 4 occasions. In only one of the calves on a single occasion was a single trypanosome found. This was apparently a temporary infection, because trypanosomes were never found again, and subsequent inoculation of virulent blood failed to produce infection.

W. Y.

KLIGLER (I. J.) & BERMAN (M.). **Susceptibility and Resistance to a Trypanosome Infection. X.—Specific Character of the Immunity produced in Rats by the Injection of Suspensions of Dead Trypanosomes.**—*Ann. Trop. Med. & Parasit.* 1935. Dec. 18. Vol. 29. No. 4. pp. 457–461.

In a former paper Kligler & COMAROFF [this *Bulletin*, 1935, Vol. 32, p. 715] showed that repeated injection of a suspension of dead trypanosomes into rats enhances their resistance to an infection with the homologous strain of the organism. The present work was undertaken to determine whether this acquired resistance is specific.

The general technique was the same as that described in the earlier paper. A heavy suspension of trypanosomes in saline was incubated at 37°C. for 2 hours, and then left in the ice-box until all the trypanosomes were dead. This saline suspension of dead trypanosomes was used for immunization; each rat received 5 injections of 1.0 cc. on 5 successive days. The infecting dose was given 3 to 5 days after the last injection. Five experiments were carried out. In two the rats were treated with *T. evansi* suspension, and then equal groups were infected with *T. evansi*, *T. gambiense* and *T. equi*, respectively. In two the rats were treated with *T. gambiense*, and then groups were infected with the three species; in the last experiment the rats were treated with *T. equi* before injection with the three species of trypanosomes.

The results of the experiments are summarized in tables from which it appears that rats treated with suspensions of dead trypanosomes develop an increased resistance to an infection with the homologous strain. The enhanced resistance is specific; an infection with another species follows the same course as in control non-treated animals.

W. Y.

CORSON (J. F.). **Antelopes as Reservoirs of *Trypanosoma gambiense*.** [Correspondence.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Apr. 8. Vol. 29. No. 6. p. 690.

Referring to the well-known experiments of BRUCE (1910) with *T. gambiense* and antelopes, Corson questions whether the existence of a chronic infection of the antelope with *T. brucei* was excluded. There seems little doubt that some at least of the antelopes became infected with *T. gambiense*, but whether the trypanosomes which were transmitted from the antelopes several months afterwards were *T. gambiense* or *T. brucei* appears to be doubtful, as no experiments were made on human beings. The importance of the subject makes it desirable that the experiments be repeated under stricter conditions.

W. Y.

BOURGUIGNON. Contribution à l'étude des trypanosomiases des suidés au Congo Belge. [The Trypanosomes of Pigs in the Belgian Congo.]—*Ann. Soc. Belge de Méd. Trop.* 1935. Dec. 31. Vol. 15. No. 4. pp. 491–499.

The observations upon which this paper is based were made during two virulent epidemics of trypanosomiasis in pigs, the first during the beginning of 1932 near Stanleyville and the second some distance north-west of Elizabethville.

The mild trypanosomiasis of pigs is mainly due to *T. congolense*. *T. brucei* is not found in pigs in nature, and these animals are immune to *T. vivax*. In 1921 WALRAVENS described a new species of trypanosome under the name *T. rodhaini*, which causes a virulent disease of pigs in the vicinity of Elizabethville. Bourguignon comes to the conclusion that *T. rodhaini* is only a variety of *T. simiae*. He then passes to a consideration of the virulent trypanosomes of pigs described by SCHWETZ (1930) and also of those found by himself in the Province Orientale in 1932 and by himself and JUSSIANT at Katanga.

The general conclusion is that the chief characters of the trypanosomiasis of pigs are firstly its great virulence for the pig and the impossibility of transmission to the usual laboratory animals, and secondly a morphology which is predominantly that of *T. simiae*. He points out that *T. simiae* resembles *T. gambiense* in that it is made up of two extreme forms, the one without and the other with a free flagellum and intermediate forms.

W. Y.

QUARTERLY BULLETIN OF THE HEALTH ORGANISATION. LEAGUE OF NATIONS. Geneva. 1936. Mar. Vol. 5. No. 1. pp. 168-181. **Animal Diseases communicable to Man. C. Trypanosomiasis.** [Report of Committee on Diseases conveyed by Animals to Man and Resolutions of Pan-African Health Conference, Johannesburg, Nov. 20-30, 1935. pp. 168-169.] DU TOIT (P. J.). **Trypanosomiasis of Domestic Animals.** [Annex I. pp. 170-179.] MACLEAN. **Notes on Trypanosomiasis.** [Annex II. pp. 179-181.]

These articles are of a general nature and contain nothing new.

W. Y.

BOURGUIGNON (G. C.) & VAN DEN BERGHE (L.) with the collaboration of LUDO VAN BOGAERT. La trypanosomiasse expérimentale du cynocéphale par voie intrarachidienne. [**Experimental Trypanosomiasis of the Baboon after Intrathecal Inoculation.**—*Ann. Soc. Belge de Méd. Trop.* 1936. Mar. 31. Vol. 16. No. 1. pp. 9-36. With 12 figs. on 6 plates.]

Information is given of attempts to infect *Papio jubilaus* intrathecally with *T. brucei* and *T. gambiense*.

Five animals were given 2 or 3 lumbar injections of the blood of guineapigs heavily infected with a strain of *T. brucei* which had been passaged through 40 guineapigs; and six animals received 2 injections, at a month's interval, of the blood of a guineapig infected with a strain of *T. gambiense* from a Mayumbe (Congo Belge) patient, which had been passaged through 22 or 23 guineapigs. Details are given of each of the 11 inoculated baboons.

Of the 5 animals inoculated with *T. brucei* one died a year later and another 2 years later; examination of the brains furnished no evidence of trypanosomiasis. A third baboon remained negative for a year and then died, but no post-mortem was made; the other two remained healthy for 3 years.

Of the 6 animals inoculated intrathecally with *T. gambiense*, two died after 2 years without signs of trypanosomiasis, one was accidentally killed after 2 years and was apparently healthy, and two others remained well for 3 years. Only one animal died 2 years after inoculation

from characteristic cerebrospinal trypanosomiasis. The course of the infection was very interesting. The baboon did not exhibit any symptoms, and its cerebrospinal fluid remained but slightly changed (30 cells per mm. with 0.60 of protein and free from trypanosomes) for almost two years; suddenly at the beginning of the third year it was discovered that the cerebrospinal fluid contained more than 200 cells per cmm. and trypanosomes, which, on inoculation into guineapigs and mice, proved to be *T. gambiense*. Three days later the monkey exhibited very definite symptoms of cerebrospinal infection and died of the disease about four months later.

A study of the pathology of the brain was made by van Bogaert, and his findings have already been summarized in a previous paper [see above p. 657].

The next portion of the paper deals with experiments undertaken to ascertain whether the serum and cerebrospinal fluid of *Papio jubilaus* of Katanga exhibited the protective or curative action commonly seen in the serum of baboons. The fluids were tested on guineapigs infected with *T. gambiense*, and the results failed to provide any evidence that either the serum or the cerebrospinal fluid of *Papio jubilaus* exerted a protective or curative action.

In view of this, it was decided to inoculate two young *Papio jubilaus* intraperitoneally, with a view to ascertaining whether they could be infected in this way. In the first the trypanosomes persisted in the peripheral circulation in small numbers for some days. The second, however, showed a definite blood infection. About two weeks after inoculation numerous trypanosomes were found in the peripheral blood and the animal had a definite febrile disturbance. In a day or two the trypanosomes disappeared from the blood, which remained negative, apart from one occasion when very scanty parasites were found, until the death of the animal, which took place two months after inoculation. Before death the baboon developed palsy in its posterior limbs, but its blood was negative and post-mortem examination failed to reveal any lesion which could be definitely ascribed to trypanosomiasis.

The authors are of opinion that this blood infection of *Papio jubilaus* in Katanga confirms their previous experimental findings that the serum does not contain protective substance. W. Y.

HERRICK (C. A.) & CROSS (S. X.). **The Development of Natural and Artificial Resistance of Young Rats to the Pathogenic Effects of the Parasite *Trypanosoma lewisi*.**—*Jl. Parasitology*. 1936. Apr. Vol. 22. No. 2. pp. 126-129.

A wild strain of *T. lewisi* was found to be pathogenic to young and not to old rats. Its virulence did not vary to any appreciable extent; it never became pathogenic to old rats and remained pathogenic to young ones. Another strain of *T. lewisi*, which had been maintained in laboratory animals for 7 years, behaved in exactly the same way.

The authors set themselves the problem of determining the age at which young rats became resistant to the pathogenic effects of this parasite. White rats in good condition were employed. The test animals were separated into groups of various ages ranging from 2 to 40 days. In every case, except in the two-day-old group, the infected and control animals were all male litter mates. The inoculations were

made intraperitoneally, and the number of trypanosomes given varied according to the weight of the animal.

The rats were divided into two categories, (1) those that were allowed to suckle their mothers and (2) those that were weaned. The suckling young were divided into 4 groups according to age, as is shown in the following table :—

TABLE 1.

Showing the death rate in a group of rats infected with T. lewisi and their uninfected litter-mate controls.

	Suckling				Weaned		
	Experimental						
Age in days	2	10	20	30	20	30	40
No. of rats	10	20	50	25	118	25	25
No. of deaths	0	0	2	0	100	19	0
Percentage which died ...	0	0	4	0	84.7	76	0
Uninfected controls							
Age in days	2	10	20	30	20	30	40
No. of rats	0	20	43	0	98	25	0
No. of deaths	0	0	0	0	3	1	0
Percentage which died ...	0	0	0	0	3.1	4	0

From these results it appears that there is a very definite age resistance developed by the young rats to the pathogenic effects of *T. lewisi*, and that the resistance is well established by the time the rats are 40 days old. It is also apparent that for some reason, which cannot be at present explained, the suckling rats were protected from the effects of the parasite. They were not immune to infection, because all became infected and showed a large number of trypanosomes in their peripheral blood. Furthermore, the mothers were shown not to be immune, as they were successfully infected at the close of their lactation period.

Owing to the fact that the development of age immunity was so definite, an attempt was made artificially to increase the resistance of the young rats so they would not be affected by trypanosomes. This was done successfully in two ways: (1) by implanting the pituitary glands of adult non-immune rats intramuscularly into the young susceptible animals, and (2) by injecting oestrin subcutaneously into the young rats. Why the implanting of pituitaries or the injection of oestrin made them more resistant to the effects of an infection of *T. lewisi* cannot be answered at this time, but work on the problem is proceeding.

W. Y.

REINER (L.), SMYTHE (C. V.) & PEDLOW (J. T.). **On the Glucose Metabolism of Trypanosomes** (*Trypanosoma equiperdum* and *Trypanosoma lewisi*).—*Jl. Biol. Chem.* 1936. Feb. Vol. 113. No. 1. pp. 75-88. [14 refs.]

This paper reports experiments by which the main steps in the breakdown of glucose by *Trypanosoma equiperdum* and *T. lewisi* have

been established ; it is of a technical nature and must be consulted in the original by those interested. Apparently the mechanism of glucose decomposition is very different in the two cases ; while *T. equiperdum* produces two 3-carbon atom compounds, *T. lewisi* forms a 2- and a 4-carbon atom.

W. Y.

TALIAFERRO (William H.) & PAVLINOVA (Yelena). **The Course of Infection of *Trypanosoma duttoni* in Normal and in Splenectomized and Blockaded Mice.**—*Jl. Parasitology*. 1936. Feb. Vol. 22. No. 1. pp. 29-41. With 5 figs. [11 refs.]

The authors summarize their paper as follows :—

" 1. The normal course of infection of *T. duttoni* in the normal white mouse approximates that of *T. lewisi* in the normal white rat, but there are striking quantitative differences :

" (a) Reproductive activity in *T. duttoni* is less and generally only a fraction of that observed in *T. lewisi* during the first of an infection, but continues at a minimal rate for several weeks.

" (b) The number of trypanosomes is ordinarily much less than in infections of *T. lewisi*.

" 2. Both the reproductive activity of *T. duttoni* and the severity of resulting infections are greatly enhanced by splenectomy and India ink blockade carried out prior to infection. They are also adversely affected by intercurrent infections. Although part of this difference is due to a lowering of acquired resistance (ablastin formation), it is largely due to a lowering of the natural resistance of the mouse. This fact is of particular interest in showing that both natural and acquired resistance to the reproduction of the trypanosomes is dependent upon macrophage function."

W. Y.

RODHAIN (J.) & HENRY (E.). Localisation cutanée du *Trypanosoma marocanum* chez le cobaye. [**Cutaneous Localization of *Trypanosoma marocanum* in the Guinea-pig.**]—*C. R. Soc. Biol.* 1936. Vol. 121. No. 13. pp. 1388-1390. With 2 figs.

In a previous paper Rodhain has drawn attention to cutaneous lesions which appeared in a guinea-pig infected with *T. marocanum*.

In general, guinea-pigs infected with the authors' strain of *T. marocanum* succumbed from the acute disease within about 30 days. Sometimes towards the end of the infection the external genitalia and neighbouring regions became oedematous. Whilst the dermis itself was thickened, it was especially the infiltration of the sub-dermal tissues which characterized this external manifestation of the acute infection.

With the object of obtaining chronic infections, guinea-pigs were treated with subcurative doses of foudadin. It was found that 0.2 or 0.3 cc. of neo-antimosan given subcutaneously caused the disappearance of trypanosomes from the peripheral blood for 10 to 15 days. If the treatment was repeated when the animals relapsed it was sometimes possible to keep them alive for several months, although in order to do so particular care was necessary, especially when the animals developed pronounced oedema under the abdomen.

By this means it was possible to follow closely the slow development of the infection ; and the presence of trypanosomes in the blood and in the skin was observed systematically at various stages of the disease. The blood from the ear was examined in thick drop preparations.

In order to obtain a drop of serous fluid from the skin a nick was made with a fine pair of scissors and pressure applied to the surrounding oedematous region by the thumb and forefinger: in this way a drop of serous fluid containing only a few red cells was caused to exude. It was observed that in these chronic infections trypanosomes appeared in the skin after one or two trypanolytic crises. They were often numerous in the skin when scanty in the blood. [A similar state of affairs is, of course, well known in rabbits and other animals in which trypanosomiasis is a chronic infection.] W. Y.

PANNIER (R.). Essai de culture de *Trypanosoma lewisi* dans le latex d'*Euphorbia characias* et *Euphorbia esula*. [Attempt at culturing *T. lewisi* in the Latex of *Euphorbia characias* and *Euphorbia esula*.] —C. R. Soc. Biol. 1936. Vol. 122. No. 16. pp. 29–30.

In 1923, FRANCHINI attempted to cultivate different flagellates in latex, but he obtained only moderate success. The author has tried to adapt *T. lewisi* to a latex. In his first experiments he used a mixture consisting of equal parts of blood and latex, and cultured the trypanosomes in hanging drop preparations. After 60 hours [temperature not stated] the trypanosomes were immobile and would not stain well. As the controls, in which blood alone was used, gave similar results, it is concluded that the latex was not toxic to the trypanosomes.

In later experiments the cultures were made in tubes. The latex of *Euphorbia characias* was mixed in different proportions with the semifluid medium of Wenyon, and the mixture sterilized at 120°C. for 15 minutes. Under such conditions living trypanosomes, which stained well, could be found in certain tubes up to the 5th day. The following day the trypanosomes seemed to have lost their undulating membrane and there were numerous agglutinations.

The author believes that experiments of this sort will establish a parallelism between the flagellates of *Euphorbia* and those of insects and of vertebrates. W. Y.

SINGER (Ernst). Die Wirkung der Chemotherapeutica auf die Trypanosomenzelle. [The Action of Chemotherapeutic Substances in Trypanosome Cells.]—Ztschr. f. Hyg. u. Infektionskr. 1936. Feb. 10. Vol. 117. No. 6. pp. 752–756.

Experiments were undertaken with the object of investigating, by means of the methylene blue decolourization method of Thunberg, the influence of chemotherapeutic substances on the dehydrases of trypanosome cells.

The technique employed was briefly as follows:—

In vitro experiments: A suspension of trypanosomes was obtained in plasma and sufficient 5 per cent. glucose and 0.1 per cent. methylene blue solutions added to make the final concentration of glucose 0.5 per cent. and that of methylene blue 1 in 50,000. To each of a series of small tubes 0.9 cc. of this suspension was added, and then 0.1 cc. of suitable concentrations of various drugs. After the air in the tubes had been exhausted by a powerful water pump the tubes were sealed and placed in a water bath at 37°C.

In vivo experiments: Mice at the height of a nagana infection were given an intramuscular injection of the various drugs, and then bled after suitable intervals. Trypanosome suspensions containing about 100 million trypanosomes per cc. were prepared and dealt with as above.

The action of the various drugs on the discolourization time of the methylene blue due to hydration of the trypanosomes was then examined. The results are given in a table in which the values are based on the time taken for the control tubes (without drug) to become decolourized. As the number of trypanosomes varied in the different experiments, the figures in the table which represent the results obtained in a number of experiments are calculated on the assumption that the controls were discoloured in 100 units of time.

The table shows that all the drugs which act on trypanosome infections, *e.g.* atoxyl, solusalvarsan, sulfoharnstoff, germanin and trypaflavin, hinder dehydration when present in higher concentrations, and increase it when present in lower concentrations.

From the *in vivo* experiments it appears that the trypanosomes, removed 20 to 30 minutes after the injection of an active dose of a chemotherapeutic substance, show a retardation of the dehydration process.

The injection of active doses of a chemotherapeutic substance causes the disappearance of trypanosomes from the circulation through phagocytosis by the cells of the reticulo-endothelial system. It is known that this system takes up only such substances as wander towards the anode. Normally, trypanosomes migrate towards the kathode, and the question arises whether chemotherapeutic substances so change trypanosomes that they tend to pass towards the anode.

Eosin is not taken up by normal trypanosomes. When, however, this dye is injected into an infected mouse 2 to 4 hours after a dose of germanin, sulfoharnstoff or neosalvarsan, it is found, when blood preparations are examined under the fluorescence microscope, that scanty trypanosomes have taken up the dye. The reason why so few stained trypanosomes are to be found is that the damaged individuals are immediately removed from the circulation by the reticulo-endothelium.

W. Y.

GRUHZIT (O. M.) with the assistance of W. D. LINDSAY, G. HENDRICKS & M. C. DODD. **Mapharsen ("Arsenoxide") in the Therapy of Experimental Syphilis and Trypanosomiasis.**—*Arch. Dermat. & Syph.* 1935. Dec. Vol. 32. No. 6. pp. 848–867. With 7 figs. [18 refs.]

Experiments described in this paper were undertaken with the object of ascertaining the value of arsenoxide in the treatment of spirochaetosis and trypanosomiasis. The preparation used is called "mapharsen"; it is meta-amino-para-hydroxyphenylarsine oxide and contains 29.01 per cent. of metallic arsenic.

The M.L.D. of mapharsen for albino rats given intravenously was about 20 mgm. per kilogram and the M.T.D. about 18 mgm. For rabbits the M.L.D. used was about 16 mgm. and the M.T.D. about 14 mgm. per kilogram. When given intramuscularly the M.L.D. for rats was 24 mgm. per kilo., and the M.T.D. about 22 mgm.

When injected intravenously into dogs in a dose of 1 mgm. per kilo. twice weekly for 9 doses, and in a dose of 2 mgm. twice weekly for six doses, the drug caused neither albuminuria nor an increase in the total nonprotein nitrogen or the sugar content of the blood. The administration was not followed by any untoward symptoms, such

as diarrhoea, nausea, vomiting or general weakness. A dose of 3 mgm. per kilo. caused occasional salivation, and a dose of from 4 to 5 mgm. once weekly frequently caused vomiting, salivation and albuminuria. Intramuscular injections into dogs of 5 mgm. per kilo. once weekly for 8 weeks caused neither vomiting nor albuminuria.

The M.E.D. of mapharsen given intravenously to albino rats infected with *T. equiperdum* was 1 mgm. per kilo. as compared with 10 mgm. and 22 mgm. for arsphenamine and neoarsphenamine, respectively. The therapeutic indices of the three substances were 18, 14, and 9, respectively.

The sterilizing doses for rats infected with *T. equiperdum* were 2 mgm., 12 mgm. and 24 mgm. per kilo. for mapharsen, arsphenamine and neoarsphenamine, respectively; and the corresponding curative indices were accordingly 9, 11.6 and 8.3, respectively.

In rabbits 1 mgm. per kilo. of mapharsen cleared lesions (the oedema subsided and the lesions became dry and cicatrized) due to *Sp. pallida* in from 12 to 36 hours. A dose of 10 mgm. per kilo. of neoarsphenamine cleared similar lesions in from 24 to 48 hours. The lesions in syphilitic rabbits had healed completely within 7 days after doses of 1 mgm. and 10 mgm. of mapharsen and neoarsphenamine, respectively.

The protective effectiveness of mapharsen in doses of 1 mgm. per kilo., given 48 hours after inoculation with *Sp. pallida* and repeated three times in two weeks, or in a single dose of 2 mgm., was about 100 per cent. for rabbits: a single dose of 30 mgm. of neoarsphenamine was required to protect 100 per cent. of the rabbits. With single doses the sterilizing indices of the two drugs were about equal, but with repeated doses mapharsen appeared superior to neoarsphenamine. Intramuscular injections of mapharsen possessed about the same therapeutic value as intravenous injections.

The general conclusion reached is that mapharsen in experimental trypanosomiasis and syphilis appears to be well tolerated, and to possess at least as high a therapeutic value as neoarsphenamine.

W. Y.

ROUBAUD (E.) & TREILLARD (M.). Infection expérimentale de *Glossina palpalis* par un coccobacille pathogène pour les muscides. [**Experimental Infection of *G. palpalis* by a Coccobacillus Pathogenic for Muscidae.**—*Bull. Soc. Path. Exot.* 1936. Feb. 12. Vol. 29. No. 2. pp. 145–147.]

Recently the authors have described the spontaneous infection of *G. morsitans* by a coccobacillus. This is the first pathogenic organism for tsetse known. It can be isolated in pure cultures, and from the cultures fresh *G. morsitans* can be infected. The infection is taken up by the proboscis when the glossina bites an animal the skin of which is soiled by the culture. The *G. morsitans* dies of a septicaemia within one to three days after biting the skin of a guinea-pig soiled with a 24-hour culture of the organism. The coccobacillus is equally pathogenic for *Musca domestica*.

The present paper records experiments to ascertain whether the organism is pathogenic for *G. palpalis*. It was found that this tsetse did develop an infection of the coccobacillus, but that it was less sensitive to the infection than was *G. morsitans*.

W. Y.

CHAGAS (Evandro). Summula dos conhecimentos actuaes sobre a Trypanosomiasis americana. [Review of Present Knowledge of American Trypanosomiasis.]—*Mem. Inst. Oswaldo Cruz*. 1935. Vol. 30. No. 3. pp. 387-416.

As the title indicates this article summarizes the present knowledge of the parasite, *T. cruzi*, its characters, transmission, reservoir hosts, the symptoms it produces and the pathology of the infection. No one could do this better than Dr. Evandro Chagas, who has been occupied in close study of the disease since it was first described by Carlos CHAGAS in 1909. The author reviews in order the geographical distribution and incidence of the disease, the Trypanosome and its evolution in the insect transmitter and in the vertebrate hosts. He considers the question of *T. verpertilionis* in bats, its similarity to *T. cruzi*, but suspends judgment as to its identity with the latter. The symptoms of the disease in man and the pathology are described. The former according to whether the form is acute or chronic, and cardiac or nervous. That the disease occurs in goitrous districts is known but the older idea that there was a goitrous form of the disease is no longer maintained; as the author states "Up to the present there is no experimental confirmation of [Carlos] Chagas' theory" that the goitre occurring in these regions is due to infection by *T. cruzi*. There follows a short section on diagnosis and a few words on prophylaxis. "Specific treatment at present there is none. Drugs with trypanocidal action have been tried by many investigators without success." (Não existe, até ao presente momento, tratamento específico para a trypanosomiase americana. Medicamentos de acção trypanosomicida tem sido experimentados por numerosos pesquisadores sem qualquer exito.)

H. H. S.

JOHNSON (C. M.) & DERIVAS (G. T.). Six New Cases of Chagas' Disease in Panama with Review of Previous Cases.—*Amer. Jl. Trop. Med.* 1936. Jan. Vol. 16. No. 1. pp. 47-57.

Since the discovery of Chagas' disease in Panama in 1931, 13 cases have been reported, one of which terminated fatally. The authors give details of this additional case, including two fatalities collected by them since March, 1935.

Apparently no age is exempt from the disease, as the youngest patient was three months and the oldest 74 years of age. Seven of the 19 cases occurred in children under three years of age, and of these three ended fatally. Of the non-fatal cases all but two were discovered accidentally during malarial surveys. In this group symptoms and signs of Chagas' disease were practically absent. There was a history of general malaise accompanied by a few paroxysms of fever.

In the three fatal cases reported in this paper, as well as in the fatal case reported by DECOURSEY, the outstanding lesion in the heart was a diffuse inflammatory type associated with a considerable degree of damage to the muscle fibres themselves. In the brain the lesions were focal and consisted of collections of nests of cells in which occasionally were seen clumps of parasites. The neuroglia were the elements which were infected. In both the heart and brain the various developmental stages of the parasites were seen.

In view of the scarcity of the trypanosomes in the peripheral blood diagnosis is a matter of difficulty, and it would seem not unlikely that

in the past some cases of Chagas' disease have been mistaken for malaria. The authors consider other reasons for believing that the incidence of Chagas' disease on the Isthmus of Panamá is higher than has been suspected hitherto. W. Y.

MAZZA (Salvador), BENITEZ (Clemente) & JANZI (Edin Z.). Primer caso de forma aguda de enfermedad de Chagas y primeros animales domésticos portadores de *S. cruzi*, comprobados en Corrientes.—*Universidad Buenos Aires: Misión de Estudios de Patología Regional Argentina Jujuy*. 1936. Publicación No. 26. pp. 28–33. With 4 figs.

TORREALBA (J. F.). Consideraciones sobre la enfermedad de Chagas en Zaraza.—*Gac. Méd. de Caracas*. 1935. Dec. 15. Vol. 42. No. 23. pp. 356–361. With 4 figs. (1 map). [41 refs.]

MAZZA (Salvador). Infestación de *Triatoma* por *Schizotrypanum cruzi* y hallazgo de animales domésticos portadores del mismo en el sur de la República (Rio Negro y provincia de Buenos Aires). Nueva especie de *Triatoma* determinada en Rio Negro. [*Triatoma Infestation by T. cruzi; Domestic Animals as Carriers in the Argentine. A New Species of Triatoma discovered in Rio Negro.*]—*Universidad Buenos Aires: Misión de Estudios de Patología Regional Argentina Jujuy*. 1936. Publicación No. 26. pp. 1–19. With 12 figs. [12 refs.]

In the Rio Negro territory [and also elsewhere] *Triatoma infestans* exists in large numbers and heavily infected with *T. cruzi*. *Triatoma platensis* may be found in the same localities, in fact in the same dwellings, as *T. infestans*, but not parasitized. A new species is described in detail in the text, with illustrations, and a table of measurements of the different parts, comparing them with *T. platensis*, male and female, which it closely resembles in some respects. The new species is called *Triatoma rosenbuschi*, after Professor F. ROSENBUSCH who was the first to study these insects (vinchuca). Three species of *Triatoma* have now been found in the Argentine naturally infected, *T. infestans*, *T. oswaldoi* and *T. rosenbuschi*. In a house in the rural district of Fuerte General Roca a kitten was found carrying *T. cruzi*.

H. H. S.

CHAGAS (E.). Infection expérimentale de l'homme par le *Schizotrypanum cruzi*. [*Experimental Infection of Man by Schizotrypanum cruzi.*]—*C. R. Soc. Biol.* 1936. Vol. 121. No. 8. pp. 769–771.

The author has continued his investigations on the experimental infection of the human being with *T. cruzi*. A volunteer (No. 7) was inoculated with the faeces of *Panstrongylus megistus* containing numerous crithidial and metacyclic forms of *T. cruzi* of human origin. The temperature rose 5 days later and trypanosomes were shown to be present in the blood by subinoculation into a guineapig on the 14th day, but were not found by direct examination by the 19th day. On the latter day the patient was re-inoculated with 2.5 cc. of the blood of a young dog containing numerous *T. cruzi*. The temperature, which had not risen beyond 38.5°C. the four previous days, rose the day after the second inoculation to 39.5°C. Six hours after the second

inoculation parasites (both narrow and broad forms) were found by direct examination of the blood. The number remained stationary for 3 days and then gradually decreased until by the 8th day only a few broad forms were to be seen.

This observation proves the existence of an initial phase of blood infection. The parasites seen 6 hours after inoculation could not have come from the tissues because the time did not suffice and because both broad and narrow forms were seen. The number of parasites inoculated on the first occasion was probably too few to enable them to be seen in blood examination, and possibly the metacyclic forms have a greater capacity for penetrating the tissues. The steady diminution in the number of trypanosomes seen in the blood during the days following the second inoculation was probably due to the trypanocidal action of the blood and to the localization of the remaining parasites in the tissues.

The organs of volunteer No. 6, who died from malignant disease 5 months after inoculation with *T. cruzi* from a *Tatusia novemcincta*, were examined. This patient also had exhibited an initial acute infection with parasites in the blood and a certain amount of fever. No parasites were found in the organs usually involved, but sections of the liver showed numerous foci of infiltration by lymphocytes, plasma cells and macrophages.

W. Y.

KOFOID (C. A.), WOOD (F. D.) & MCNEIL (R.). *The Cycle of Trypanosoma cruzi in Tissue Culture of Embryonic Heart Muscle.*—*Univ. California Public. Zool.* 1935. Vol. 41. No. 3. pp. 23-24.

Details are given of the cyclic growth of *Trypanosoma cruzi* in tissue cultures of embryonic heart of rat and mouse.

The tissue cultures were made from 14- to 16-day rat and mouse embryos. They were grown in plasma-embryo extract medium on 7.4×4.5 cm. slides having a depression 4 mm. deep. They were incubated 24 hours at 37°C. before being inoculated with culture forms in semi-solid blood agar medium of the California strain of *T. cruzi* from the wood rat. Cultures were examined at frequent intervals during the first 24 hours after inoculation, and at least twice daily thereafter for 6 days.

Some of the crithidial culture forms used in the inoculum survived in the medium as long as the experiment lasted (7 days) and apparently continued to multiply. During the first 24 hours there was a decrease in the number of trypanosome forms in the culture medium, these seemingly being the forms which entered the tissues. After 48 hours the free-swimming trypanosomes were very rare or absent. In cultures 24 hours old trypanosomes and many crithidias could be seen adhering to the muscle tissue, fibroblasts, and macrophages. Although several of the adherent forms were watched for 20 minutes actual penetration of the cells was not observed.

The opacity of the muscle made it difficult to determine what was taking place within it, but the macrophages, fibroblasts, and extra-cellular parasites could be easily observed. At 24 hours many macrophages contained from one to several motile flagellates. On the third day granular debris from degenerating macrophages was observed to contain wriggling flagellates. No flagellates were seen in the fibroblasts.

Trypanosomes of the type found in the circulating blood were first seen on the 5th day after inoculation. They were at first localized

as they emerged from the massed leishmaniform phases, and were generally shorter than the long slender metacyclic forms which occur in the culture tube and insect vector. These blood forms were often found in loosely associated groups in the plasma surrounding the heart muscle from which they had recently emerged.

In the sectioned material of 24-hour preparations, macrophages containing one or two parasites were numerous. These parasites were either in the crithidia or leishmania stage, probably the former. Although these crithidial stages are not supposed to be infective, it is obvious that they enter or are ingested by macrophages, and that they may survive the death of the cell. Possibly, they eventually develop into infective forms, either within or outside of body cells.

Groups of typical leishmaniform bodies were first seen in sectioned heart muscle on the 4th day after inoculation. Some of the groups were typical with no flagella, whilst others were of the stubby crithidial type with short flagella. A few groups of very slender trypanosomes with round or oval parabasals were noted.

The authors conclude that the development of *T. cruzi* in tissue cultures of heart muscle is the same, with respect to time and stages of its cycle, as its development in the body of the living vertebrate host.

W. Y.

MAZZA (Salvador) & PALAMEDI (Benito). Forma aguda benigna de enfermedad de Chagas observada en Barranqueras, Chaco.—*Universidad Buenos Aires: Misión de Estudios de Patología Regional Argentina Jujuy*. 1936. Publicación No. 26. pp. 19–22. With 1 fig.

MAZZA (Salvador) & VALLE (Fernando A.). Forma aguda benigna de enfermedad de Chagas observada en Puerto Tirol, Chaco.—*Universidad Buenos Aires: Misión de Estudios de Patología Regional Argentina Jujuy*. 1936. Publicación No. 26. pp. 25–28. With 1 fig.

MAZZA (Salvador) & CORSI (Eduardo M.). Tercera observación de forma aguda benigna de enfermedad de Chagas en Presidente de la Plaza, Chaco.—*Universidad Buenos Aires: Misión de Estudios de Patología Regional Argentina Jujuy*. 1936. Publicación No. 26. pp. 22–25. With 2 figs.

MAZZA (Salvador) & MAINOLI (Martin R.). Forma aguda benigna de enfermedad de Chagas comprobada en el departamento de Anta (Prov. de Salta).—*Universidad Buenos Aires: Misión de Estudios de Patología Regional Argentina Jujuy*. 1936. Publicación No. 26. pp. 34–39. With 1 fig.

CUENCA (Heberto). La forma cardíaca de la enfermedad de Chagas, con presentación de nuestro primer caso.—*Gac. Méd. de Caracas*. 1935. Dec. 15. Vol. 42. No. 23. pp. 361–365. With 3 figs.

MALARIA.

PROCEEDINGS OF THE ROYAL SOCIETY OF MEDICINE. 1936. Mar. Vol. 29. No. 5. pp. 537-562. (Sect. of Epidemiol. with Trop. Dis. pp. 1-26). With 19 figs.—**Discussion on the Malaria Epidemic in Ceylon 1934-35** [BRIERCLIFFE (R.), DALRYMPLE-CHAMPNEYS (Weldon), WIGGLESWORTH (V. B.) & others].

This discussion was of great general interest; it comprised:—Examples of misleading reports in the lay press. An outline of the measures taken and the difficulties of the task. The opener's view of the main factor in the causation of the epidemic. The sudden onset of the epidemic. The predominance of benign tertian. The secondary wave. Remarks by Dr. Wigglesworth on the habits of *A. culicifacies*. Col. James' theory of the action of susceptibility as a factor in the epidemic. Professor Schulemann's remarks on exaggerated claims for atebirin musonate. His standard treatment. Dr. Kikuth's opinion of the danger of intravenous injections. The discussion was opened by Sir Weldon Dalrymple-Champneys who read a joint paper prepared by Dr. R. Briercliffe and himself.

Misleading reports. Difficulty of task. Measures taken.—Very misleading accounts of the epidemic appeared in the lay press; for instance a report of 5,000 deaths in a particular district became 50,000 in an English newspaper, and had swollen to 500,000 by the time it reached America. Again, a reporter cabled that there was a "green caterpillar pest" and that thousands were being buried in the Kuru-negalla district. In the American papers, the word "catapillar" was omitted, it was reported that thousands were dying from the green pest and numerous requests were received by the Ceylon medical department for specimens of the "green malarial parasite." The Opener said he could testify as an eye-witness to the splendid way in which Dr. Briercliffe had handled this unprecedented epidemic in very difficult circumstances and in the face of much hostile criticism and misrepresentation. It had been suggested by critics that the epidemic could have been brought to an earlier conclusion by widespread antilarval measures. Carefully drawn maps and calculations show that it would have been necessary to treat about 7,000 miles of watercourses. A coolie employed in antilarval work deals with about $1\frac{1}{2}$ miles a day at a cost of about 10 rupees a mile. The cost would have been out of proportion to the benefit to be expected, even if the trained personnel necessary for such work had been available, which was not the case. Dr. V. B. Wigglesworth who contributed the second paper of this Discussion, stated "it was noted in Ceylon during the epidemic that *culicifacies* larvae occurred not only in the marginal pools, but also in the main bodies of water in the rivers. That means that the larvae must be carried downstream, and however well one stretch of river is controlled, fresh larvae will be continually brought downstream to it." He said that the three spots which he visited in the East where he felt least hopeful about antimosquito measures in rural areas were the three places—the Punjab, the Madras Agency, and Ceylon—where *culicifacies* was the chief malaria carrier. In spite of all these difficulties a mobile organization, consisting of locally recruited labour under trained personnel was rapidly built up in Ceylon and some 300 miles of the four main rivers and their tributaries were brought under control, oiling being confined to areas in

the neighbourhood of large villages. "The most important anti-malarial measure undertaken was the treatment of patients suffering from the disease. The standard treatment for adults was $7\frac{1}{2}$ grains of quinine sulphate or bisulphate in solution three times a day." Additional measures undertaken to cope with the outbreak have been described already in this *Bulletin* (see Briercliffe and also James, above).

Main factor in causation of epidemic.—The authors of the opening paper consider that the main factor in the causation of the epidemic was the prolific breeding of *A. culicifacies* in pools left in the beds of the large rivers which had been dried up by the drought. Similar pools are often present in smaller rivers, even in normal years, but, because the narrow streams are shaded, *A. culicifacies* does not breed in them; it selects shallow pools of still, clear water exposed to sunlight. The reason that Galle and Matara, in the extreme south of the wet zone, remained free from the epidemic was because the rainfall for the year in these districts was up to the average, no actual drought occurred, the rivers were flowing as usual, *culicifacies* was not found and malaria did not occur.

Did the epidemic begin suddenly?—There is some difference of opinion as to the manner in which the epidemic began; the authors state that it began suddenly and they write, "The explosive nature of the onset was at first the characteristic feature of the epidemic. . . . The epidemic . . . burst with amazing suddenness in the Deduru Oya basin, which in the course of a week was completely involved."

Type of parasite and infection rate of anopheles.—Throughout the epidemic benign tertian infections predominated, the relative proportions of the three parasites from November 1934 to March 1935 being *P. vivax* 62.2, *P. falciparum* 36.7, and *P. malariae* 1.1 per cent. The proportion of subtertian infections increased, however, from 24.7 in November to 43.4 in January, and fell to 28 per cent. in March. In December, 12.9 per cent. of the *culicifacies* were infected and in some places the infection rate was as high as 19 per cent. Out of 5,063 anopheles collected in dwellings from November onwards, 88.5 per cent. were *A. culicifacies*.

Was the secondary wave due to recurrences?—"At the end of the first week of April, a secondary wave of malaria started to sweep over the epidemic area. It was not unexpected. . . . The disease generally was of a much milder character during the secondary wave than during the early months of the epidemic and deaths were not so numerous." This secondary wave was not due only to recurrences, because "many persons who had not previously suffered from malaria were infected, certain villages which had hitherto escaped lightly or even completely were involved, and in the Mahaweli Ganga basin new areas were invaded. But the most interesting extension of the epidemic was upwards, . . . in May and June, malaria broke out in villages on the banks of streams situated 3,500 to 4,000 feet above sea-level. . . . Previously at these elevations, the larvae of *culicifacies* had rarely been found and the adults never."

Dr. V. B. Wigglesworth spoke of the habits of *A. culicifacies* in different parts of India, (a) In Assam, it breeds in myriads during the dry season in clear pools left in the river beds; but it is of no importance because this is the cold season and no transmission takes

place. Here *A. minimus* breeding in the grassy-edged streams is the carrier. (b) In the Anamalai Hills of South India, *A. culicifacies* breeds in the rivers and streams, but it does not thrive there during the season suitable for transmission (March to June) and it is of no importance. Here *A. fluviatilis*, a close ally of *varuna*, is the carrier. (c) In the Punjab *A. culicifacies* finds breeding places every year in the smaller irrigation canals, in seepages from the larger canals, and in pools in dried up water-courses. Villages close to these places are centres of endemic malaria. These places have much in common with the malarious dry zone of Ceylon. In years of exceptional rainfall innumerable temporary breeding places are created, wide tracts of the Punjab become infested with *A. culicifacies* and, if these conditions develop after an interval during which the people have lost their immunity to malaria, devastating epidemics result. As in Ceylon, an epidemic is determined by the coincidence of an abundance of *culicifacies* and a non-immune population. Excessive rainfall favours *culicifacies* in the Punjab, excessive drought in south-west Ceylon. In another part of India, however, the hilly districts of the Madras Agency, the malaria season begins when the rivers dry up and contain residual pools. Here, it is not an exceptional phenomenon, as in Ceylon, but an annual event in a region of hyperendemic malaria.

Colonel S. P. James, enunciated a theory in explanation of the importance of lack of immunity in determining an epidemic (see also James below, p. 684). Why is lack of immunity an important factor in causing an epidemic? "According to the results of laboratory work at Horton the answer was that in non-immune persons suffering from malaria, gametocytes appeared in the blood more frequently and in far greater numbers than in immune persons. . . . When anopheles fed upon these patients their stomachs became crowded with from 300 to 800 oöcysts, with the result that enough sporozoites were produced to infect many people and to keep the insect infective throughout its life. But when anopheles fed upon malaria patients possessing some immunity, the number of oöcysts found on their stomachs seldom exceeded 10, with the result that the sporozoites produced were all used up in biting two or three people and the mosquito remained infective for only a very few days. . . . Lack of immunity in the population at risk was the first requirement for the production of heavily infected mosquitoes and therefore it was an important factor in the causation of an epidemic."

Professor W. Schulemann said that Simeons had stated that in peroral treatment with atebirin, three days must be lost until the liver became saturated with the drug, but that this statement was not in accordance with facts. He considered that Simeons' practical conclusions were too far-fetched. A "*therapia sterilisans magna*" by injecting large doses was impracticable, peroral treatment was to be preferred except in very serious cases, and should be specially chosen to prevent relapses. He thought that atebirin musonate had many advantages over quinine when injections were required. The standard treatment to be recommended was:—Atebrin 0.3 gram daily by the mouth for 5 to 7 days; then, plasmoquine 0.02 gram daily for 3 or 4 days. Subsequently 0.2 gram atebirin and 0.02 gram plasmoquine on one day of the week, and 0.2 gram atebirin alone on another day of the week. But where good supervision was not possible, or where there was a floating population, atebirin should be given without plasmoquine.

Dr. Kikuth said that he was "unable to commend Simeons' practice of injecting the total daily quantity of atebirin musonat at one dose. Intravenous injections, both of atebirin musonat and quinine were superfluous and dangerous."

W. Fletcher.

GILL (C. A.). **Some Points in the Epidemiology of Malaria arising out of the Study of the Malaria Epidemic in Ceylon in 1934-35.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Feb. 29. Vol. 29. No. 5. pp. 427-466. With 17 figs. [23 refs.] Discussion pp. 466-480. With 2 maps & 3 charts.

The author's theory is that the epidemic began with a fulminating outbreak of relapses among healthy carriers due, apparently, to an excessive increase in atmospheric humidity. The abnormal number of anopheles was not the cause, though it was partly responsible for the magnitude of the epidemic.

Colonel Gill's official Report on the Ceylon epidemic has been summarized already in this *Bulletin*, 1936, Vol. 33, p. 214; in his present paper he deals more particularly with its causes. He emphasizes "the powerlessness of modern medical science to prevent the outbreak of malaria epidemics or to check materially their course," though in his Report he implied that future epidemics in Ceylon might be warded off by antimalarial measures undertaken during the inter-epidemic period. He is of opinion that little can be done to control malaria except in towns and closed communities; "what of the large free population of rural areas, numbering more than 80 per cent. of the total? . . . despite the great advance of knowledge during the past 50 years, the control of malaria, as a practicable proposition, is almost as far to seek as it was a century ago." In the discussion which followed the paper, this pessimistic view was criticized by Sir Malcolm WATSON who instanced the success of antimalarial work carried out by himself in a rural area of the Malay States.

Colonel Gill states that the great malaria epidemics of the Punjab, Mauritius and other places have been associated with particular sun-spot phases. "In Ceylon, the association of malaria epidemics with the epoch of maximum and minimum sun-spots is extremely close. . . . For the present, it will suffice to state that the relationship of malaria epidemics to the sun-spot cycle is sufficiently close to permit of the conclusion that the cyclical periodicity of malaria epidemics is attributable to the changes in world-weather associated with periodic oscillations in solar activity."

Special weather conditions are associated with malaria epidemics; in the pre-epidemic period there is a rise of atmospheric humidity. In the wet zone of Ceylon there was a failure of the south-west monsoon with a progressive decline of atmospheric humidity during July, August and September, with the result that the rainfall in October, though it was below normal, occasioned a sharp rise in humidity, which occurred at the end of September, three weeks before the outbreak of the epidemic. The severity of the epidemic was greatest where this rise was greatest. It was very high, for example, in Kurunegala, the focal centre of the epidemic.

Such a change in humidity appears to cause "a change in the relationship of the malaria parasite and the human host, whereby, at the commencement of an epidemic, an 'epidemic of relapses' is precipitated amongst human carriers." Why does Colonel Gill believe

that the Ceylon epidemic began as an epidemic of relapses? In the first place, it began with fulminating suddenness; "not only was the onset of the epidemic remarkably abrupt but . . . it could often be fixed to a day. Thus, at the Civil Hospital, Kurunegala, the daily average number of attendances, which had fluctuated between 130 and 150 per diem for several months before the epidemic, was more than doubled on 29th October, 1934, with the result that the total attendances, which in the week ending 27th October were 1,305, numbered 2,763 at the end of the following week . . . it was decided to confine attention to a single locality and Kurunegala town, population 10,500, was selected for this purpose, partly because it was the most severely affected large town in the island, and partly because exceptionally complete statistical data were obtainable." A second point in favour of the relapse theory was that very few children suffered during the first few weeks of the outbreak. ". . . it is difficult to believe that the morbidity amongst adults during this period could have been mainly caused by new infections, since it would imply that infected anophelines had selected adults alone for attack. Furthermore, . . . it would be necessary to assume that a large number of anophelines had become infected from such human carriers as existed during a period of good health, and had thereafter dispersed, and, in due course, infected a large number of persons (*excluding children*) about the same time, who, after an identical incubation period, commenced to fall ill together. This sequence of events is too improbable to call for serious consideration, and it is therefore held that the sickness during the first month of the epidemic was mainly due to an 'epidemic of relapses' amongst apparently healthy human carriers."

The next step in the epidemic was the spreading of the infection from the relapsed cases to the surrounding non-immune population by an abnormal abundance of anopheles. *A. culicifacies*, in normal times, is not prevalent in the Wet Zone, where the epidemic occurred, it is much less common there than in the Dry Zone, but, in 1934, it was extremely prevalent much to the south of its normal habitat and bred freely among the pools in the beds of the dwindling rivers. The coincidence of the following was responsible for the magnitude and severity of the epidemic: (1) A large number of relapses following an abnormal rise in atmospheric humidity associated with cyclical sun-spot changes; (2) An abnormal prevalence of the carrier species of anopheline, *A. culicifacies*; (3) A non-immune population suffering from privation due to the drought.

In the discussion which followed, Colonel S. P. JAMES brought to notice a suggestion made to him by Dr. DE VERTEUIL of Trinidad that the onset of rain after the 1934 drought in Ceylon might have caused a migration of anopheles from the malarious Dry Zone into the Wet Zone and that this was responsible for the epidemic. Migration on a small scale occurs annually in Trinidad, but, at intervals, and after a prolonged drought, migration occurs on an immense scale.

W. F.

ELLISON (F. O'B.). *Malaria Epidemics and Sun-Spot Cycles*.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Apr. 8. Vol. 29. No. 6. pp. 659-665.

"Colonel Gill (above) has suggested that a definite correlation exists between the maximum and minimum development of

sun-spots and epidemics of malaria. . . . The relation between malaria epidemics and sun-spot activity is not as close as Gill would have us believe either in Ceylon or elsewhere. The last two outbreaks in Ceylon, 1934 and 1928, do, it is true, coincide with a minimum and a maximum of sun-spots, but from 1923 back to 1905, epidemics both in Ceylon and elsewhere, taking Gill's own dates with one or two necessary corrections, have prevailed during one and a half complete sun-spot cycles with absolute impartiality at sun-spot maximum, minimum and every stage in between." W. F.

JAMES (S. P.), NICOL (W. D.) & SHUTE (P. G.). **Clinical and Parasitological Observations on Induced Malaria.** (With Notes on their Application to the Study of Malaria Epidemics by S. P. JAMES).—*Proc. Roy. Soc. Med.* 1936. June. Vol. 29. No. 8. pp. 879–893 (Sect. Trop. Dis. & Parasit. pp. 27–41). With 16 figs.

[This is a very important and interesting paper. Colonel James's theory of the Ceylon epidemic, based upon experiments with the Madagascar strain at Horton Mental Hospital, seems to be as follows: There was a great increase in the number of anopheles; the population was non-immune. Malaria increased gradually until a point was reached where transmission among the highly susceptible population was being repeated at a great rate. This procedure (as shown by observations at Horton) results in a fundamental change in the nature of the endemic strain of parasite which becomes converted into an epidemic strain; the special attribute of such an epidemic strain is its reproductive vigour—it increases much more rapidly in the blood, and it produces many more gametocytes. This produces a far heavier infection of anopheles, and, consequently, a much heavier dose of sporozoites of the vigorous epidemic strain is injected into the host. This is responsible for the severe type of disease characteristic of epidemic malaria.]

Colonel James made the interesting statement during his lecture, that atebirin acts as a causal prophylactic, destroying the sporozoites of benign tertian malaria.]

Epidemic malaria and endemic malaria differ from one another clinically; endemic malaria is comparatively mild and seldom kills, but epidemic malaria is severe and often fatal. What is the reason? It is generally attributed to lack of resistance due to poverty, famine and the like which sometimes, as in Ceylon, happen to coincide with the epidemic. The author's work at Horton has led him to other conclusions; he ascribes the clinical malignancy of epidemic malaria rather to a change in the nature of the attacking parasite than to a change in the defensive powers of the host. "The change in the parasites which we have observed at Horton (and which we think may be the change that is responsible for the severity of epidemic malaria) is not an increase of virulence, but an increase of physical vigour and vitality leading to the production of individuals which represent the species in its perfect form. In these individuals the normal processes of reproduction, sexual as well as asexual, are carried on in the most regular and complete manner of which the species is capable. . . . the number of parasites . . . exceeds considerably the number which appears in the blood of persons infected with a less active strain . . . and the result of using a strain which reproduces itself freely and vigorously is that non-immunes of normal,

susceptibility who are infected with it develop the severe epidemic type of the disease." Colonel James did not describe in detail the technique by means of which he brought the endemic "Madagascar strain" to the degree of physical vigour and activity in which it caused cases of the severe epidemic type, but an essential part of this technique consisted in passing the strain repeatedly through persons who possessed no resistance to malarial infection. When this change to epidemic type has been effected, the strain produces gametocytes earlier and in greater numbers. Normally, no gametocytes are found during the first five days in patients infected with the Madagascar strain, and in only 33 per cent. are they found during the first week; but, after the strain has been passaged according to Colonel James's "plan," gametocytes are found in some cases as early as the third day, and in 82 instead of 33 per cent. they are found during the first week. The number of gametocytes in the blood is much more numerous after the "plan" than before it and mosquitoes are much more easily and heavily infected; it was with this object that the "plan" was originally devised. As regards the clinical change, after the "plan," the onset of fever is more like that seen in a subtertian infection than in benign tertian; it begins as an irregular fever, without rigors, which increases daily until, by the 5th or 6th day, there are one or two paroxysms every day; finally parasites become so numerous, and the patient becomes so ill, that the attack must be cut short by quinine. There is usually a relapse or "recrudescence" 3 weeks later, and one or two more afterwards at similar intervals. Subsequently, there is a long period of freedom, and then, suddenly, a sharp recurrence at about the 7th month which may be followed by several recrudescences. How can a relapse be distinguished from a primary attack? By the temperature chart, and by blood films. A relapse begins abruptly with a rigor, instead of gradually like a primary attack; subsequently, there are paroxysms every other day, instead of every day, and gametocytes are present as early as the first or second day.

Colonel James next considered the dose of infection. Infection by the bites of two or three lightly infected mosquitoes is usually quite different from the result of infection by the bites of many heavily infected insects. When only a small dose of sporozoites is injected the result is an abortive primary fever which passes off in two or three days, or there is no primary attack at all, and the infection remains latent. In either case, seven months later, at a period corresponding with the period of recurrence in the severe type, there is a sudden sharp attack. This observation is a repetition in the laboratory of what happens in countries like Holland where (because only one or two lightly infected mosquitoes are responsible for each indigenous case) most of the cases are abortive or latent in the primary attack and are only detected at the period of recurrence in the following spring. In benign tertian malaria, the condition of latency can always be produced by a few prophylactic doses of *atebrin* which kills most, but not all, sporozoites injected by a mosquito. The recurrences, or late relapses, which appear 7 months after the primary attack of benign tertian, occur only in cases infected by the bites of mosquitoes, they are never seen in cases induced by the inoculation of malarial blood. Recurrences are not in any way dependent on climate, season or atmospheric humidity. "In India, the onset of recurrences between six months and a year after anti-relapse schemes of treatment upsets

cherished opinions based on a period of observation of only two months." (See SINTON below.)

The annual summer-autumn epidemic of malaria in Europe begins with benign tertian and becomes predominantly subtertian later. What is the explanation of this? Malignant tertian malaria is an acute disease comprising a primary attack followed by several recrudescences at short intervals. There is no recurrence, the total duration of febrile manifestations seldom exceeds 6 months and is usually less. By the time anopheles have become prevalent in the early summer, nearly all the cases of malignant tertian have ceased to relapse, but cases of benign tertian are still having recurrences and recrudescences; gametocytes are plentiful in the blood of these cases, anopheles readily become infected and consequently benign tertian predominates.

Colonel James next viewed the Ceylon epidemic in the light of the observations already recounted. First, he dealt with the question whether the epidemic was initiated by an outburst of relapses or whether it started with an increase of primary cases, and, as evidence, he took the temperature charts and the blood films. Sixty-three charts from the Kandy Hospital, recorded in the early part of the epidemic before the middle of November, showed only 6 which represented recrudescences or relapses; the remainder were charts of primary cases with one or more febrile paroxysms every day. As regards the parasitological evidence on this point, Colonel James considered a study of blood films made by Dr. WIJERAMA at Colombo. This observer found no gametocytes during the first 6 weeks of the epidemic and this "is strong evidence for the view that most cases during that period were primary attacks." As confirming this view Colonel James considers the evidence of Dr. P. B. FERNANDO of Colombo who noted that a feature of the epidemic was the uncommonly heavy parasitic infections met with. "This accords with what I said in the earlier part of my paper about the cause of the severity of primary attacks in cases infected with our Madagascar strain."

The next question was whether the epidemic began suddenly or gradually. Here again, Colonel James decided on the evidence of Drs. WIJERAMA and FERNANDO. "The curve starts with cases admitted during the week ending October 7th when one film positive for *P. vivax* and one for *P. falciparum* were recorded." After a period of gradually rising prevalence lasting about 8 weeks, both types began to rise sharply and, a week or two later, malignant tertian malaria evidently became severely epidemic. "It seems as if we must decide that the epidemic began gradually rather than suddenly and that it did not become explosive in character until it had been increasing steadily for six weeks or more." The low mortality at the beginning of the epidemic, next the rise of mortality in children, and later in adults, are considered to be consistent with the view that the endemic strain gradually attained its maximum vigour in the same way as it was attained experimentally by the Madagascar strain. The course of the Ceylon epidemic was not different from epidemics in other places where the bulk of the population possessed little immunity. For example, the town of Nemi, near Rome, is ordinarily free from malaria and anopheles are very rare; but, when Lake Nemi was lowered 14 metres in a search for Caligula's barges, numerous breeding places were created, anopheles became very abundant and there was an epidemic of malaria. "This epidemic, like the epidemic in Ceylon, showed that in an area where there are few gametocyte carriers and

almost no anopheles, an invasion by great numbers of these insects can give rise to a serious epidemic provided the population at risk possesses no immunity to the disease. It is equally true that areas in which there are plenty of anopheles, but no gametocyte carriers, may almost immediately suffer from an epidemic when a number of gametocyte-carrying cases are imported." W. F.

GILL (C. A.). **The Mode of Onset of the Malaria Epidemic in Ceylon.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. June 30. Vol. 30. No. 1. pp. 101–107.

A study of temperature charts and of records of blood examinations received from Ceylon led Lt.-Col. S. P. JAMES to the conclusion that the 1934–35 epidemic of malaria in that island started gradually and was associated with a slow, steady increase of primary infections. Colonel Gill, on the other hand, is of the opinion that the epidemic started suddenly by means of an "epidemic of relapses" [*ante*, pp. 213–220, and also above].

In the paper under consideration Colonel Gill reproduces tables of hospital and dispensary returns, and of blood examinations of residents of Colombo, which, he considers, supports his thesis that the onset of the epidemic was associated with a sudden outbreak of relapses which was followed about one month later by a sudden outburst of primary infections. Norman White.

FERNANDO (P. B.) & SANDAKASAGARA (A. P.). **A Clinical Study of 647 Patients treated for Malaria during the Ceylon Epidemic of 1934–1935.**—*Ceylon Jl. Sci.* (Sect. D. Med. Sci.) 1935. Dec. 3. Vol. 3. Pt. 4. pp. 195–233. With 1 fig. [13 refs.]

Relapses are more frequent after atabrin than after quinine. Atabrin is more toxic than quinine or plasmoquine.

The 647 cases were under the authors' care in the General Hospital, Colombo. Benign tertian was common at the beginning, but during the explosive stage of the epidemic subtertian infections predominated; as it declined the proportion of benign tertian cases increased. The case mortality was 4·3 per cent. but more than a quarter of the fatal cases were moribund on admission. There were 54 cerebral cases, and 19 of an oedematous type which appeared to belong to the same category as war oedema or starvation oedema. The patients were treated as follows (according to Table I which does not include all): (1) Quinine 21 grains daily for 7 days, or for period of stay in hospital,—220 cases. (2) Atabrin 0·3 gram daily for 5 days—144 cases. (3) Atabrin and quinine in the above doses for 5 days—39 cases. (4) The same, with 0·02 gram of plasmoquine daily for 5 days—28 cases. (5) Quinine 21 grains daily and plasmoquine 3 grains daily—10 cases. [This is probably a misprint, 3 grains is equivalent to nearly 0·2 gram.]

The authors concluded that quinine was superior to atabrin in bringing down the temperature and in preventing relapses. There were about 3 times as many relapses after atabrin as after quinine. Toxic symptoms occurred in 3·3 per cent. of 299 cases treated with atabrin and "one patient died as the result of atabrin poisoning." In another, pain starting on the 5th day was severe enough to require morphia; two patients collapsed after 3 days' treatment [the details

of the fatal case are not very convincing; the patient had received, apparently, only 6 tablets]. The authors consider atebtrin contra-indicated in cases of kidney disease, and intravenous quinine contra-indicated when the blood pressure is below S.90. They conclude that quinine is still the most valuable anti-malarial drug available and that atebtrin is more toxic than quinine or plasmoquine. Plasmoquine they found non-toxic when given in doses of 0.02 gram daily for 5 to 8 days. W. F.

SINTON (J. A.). **A Discussion of Some Points contained in the "Third General Report of the Malaria Commission" on "the Therapeutics of Malaria."**—*Quarterly Bull. Health Organisation, League of Nations*. Geneva. 1935. Dec. Vol. 4. No. 4. pp. 643-707. [25 refs.]

The author attacks the Commission for saying that it is useless to give plasmoquine or alkalis with quinine. He regards much of the advice given in the Report as impracticable or dangerous to life.

His first criticism is that while it is stated on the first page of the Report [this *Bulletin*, 1933, Vol. 30, p. 837] that it is based on the findings of research workers in several countries as the result of their experience with cinchona alkaloids and synthetic remedies in the field, yet, as one reads further, one finds that the bulk of the work to which prominence is given was conducted under laboratory conditions in mental hospitals, and further, almost at the end of the Report, one finds the statement that the subject is dealt with "from the point of view of persons who are in a position to obtain expert medical advice and efficient care *rather than from that of the mass of the population of malarious countries.*" While he admits that the Report is most valuable to a certain class of research worker, it has come to his notice that, in many instances, it has hindered rather than helped the clinician in the tropics.

Colonel Sinton has reported excellent results in the prevention of relapses by the administration of a combination of quinine and plasmoquine. The Commission in their Report consider that this treatment is of doubtful value, and that the claim that giving plasmoquine in addition to quinine prevents relapses "can only be described as paradoxical." In confutation the author cites the results of this treatment at Kasauli:—

"In the early days of the Malaria Treatment Centre, when intractable chronic relapsing cases of malaria were sent to Kasauli from all over India, these were mainly benign tertian infections. In those days when the value of different cinchona alkaloids was being tested, the Centre had usually about 200 patients and a waiting-list of many others requiring admission. Since the introduction of the combined quinine and plasmoquine treatment as a routine in the army, more especially for the treatment of such quinine-intractable cases, the numbers fell so low that the Centre had to be closed. . . . by this means a much higher percentage of permanent cures can be obtained under certain conditions than with quinine therapy or with plasmoquine alone in non-toxic doses. . . . In the work of the Malaria Treatment Centre it was shown that the combined treatment with plasmoquine reduced the number of parasitic and clinical relapses in chronic benign tertian infections to about 10 per cent., during an observation period by blood examination of at least 8 weeks after the termination of treatment. On the other hand, with any course of treatment with the cinchona alkaloids alone, the relapse rate in this type of case averaged about 65 per cent. in the same period."

The daily dose of plasmoquine recommended is 0.015 gram under medical supervision.

The Commission states in its Report that, owing to lack of knowledge of the natural course of benign tertian malaria and of the most important type of relapse which occurs about 8 months after the primary attack, "the results of all clinical tests conducted prior to 1931 were quite misleading." The author writes: "From a consideration of the objections raised by the Commission in its Report, it does not appear to me that such a sweeping statement is justified in the case of the infections studied at the Malaria Treatment Centre, Kasauli, before 1931. There is considerable evidence to show: . . . (2) That the patients were observed under much more natural conditions than in mental hospitals; (3) That, with the method of observation used, the occurrence of 'late' relapses in the 'natural course' of benign tertian malaria does not invalidate the results obtained to any marked degree; and (4) That the findings recorded have proved of much practical value to workers in India." He suggests that, even if one admits that late relapses are a normal event and not a peculiarity of the particular strains with which the Commission worked, the infection would have been detected during the regular routine thick-film examinations made during the first 8 weeks after the cessation of treatment at Kasauli. With reference to subtertian malaria, he writes:—

"In condemning or depreciating the results recorded with the 'quinine and alkali' treatment of malignant tertian malaria, the Commission appears to have overlooked its own statements—that different drugs may react differently on different strains, and to have allowed its judgment to be biased by the results of experiments with a few very virulent strains of *P. falciparum*. In view of the great differences in the reaction of different strains to therapeutic agents, I cannot understand why the Commission is unable to accept the results of our Indian work."

It is suggested in the Report that relapses are more easy to cure than primary attacks, but most of the author's Kasauli patients had had 3 or 4 febrile relapses before they came to him, yet 65 per cent. relapsed after treatment with quinine—*i.e.* appreciably higher than the 50 per cent. mentioned by the Commission as occurring in primary infections receiving much less treatment.

The Commission deprecates the employment of a standard treatment and advocates that each individual case should be treated on its merits, taking into consideration the virulence of the strain of parasite, the degree of immunity and the stage of disease, whether primary attack or relapse; but, says the author:—

"Unfortunately, I am unaware of any methods by which this can be done either clinically or microscopically under natural conditions . . . there are very few places in the tropics or other malarious countries where it would be possible to carry out . . . the lines of investigation recommended by the Commission, because one would have to assume that *all the strains* of one species of *Plasmodium* were identical in a given area, for there is no known method of differentiating these strains by their morphological characters. Such an assumption does not seem justifiable. . . . The patient may be infected with multiple strains of the same species of parasite . . . it is at present, impossible under natural conditions, or in the laboratory, to determine with any scientific accuracy whether the attack being studied is a relapse, a reinfection with a homologous strain, or a superinfection with a heterologous one."

In Sinton's "standard treatment" quinine is given in those doses which are considered necessary to cure radically within a week the majority of the strains of parasite. If the patient develops a relapse he is given a treatment which contains plasmoquine in combination with quinine. Some "standard treatment," urges Colonel Sinton, is an essential measure, if one is to obtain the greatest benefit of the greatest number of patients for the money available.

The Commission states that quinine has but little effect when given on the first or even the second day of the initial fever. They also state that in hospitals where there is insufficient watchfulness the fatality due to their strain of benign tertian is not less than 10 to 14 per cent. Colonel Sinton draws attention to the danger of undetected mixed infections, and asks:—

"If delayed treatment in benign tertian infections can cause such an excessive mortality, even among patients receiving ordinary care in hospital, how much more dangerous is such a plan of treatment likely to be in general practice? . . . If treatment be withheld on the assumption that the primary diagnosis of *P. vivax* is correct, the rapid development of *P. falciparum* may remain undetected until therapeutic measures are too late to save the life of the patient. . . . However desirable such 'delayed treatments' may be for the purposes of researches into the value of certain therapeutic agents, . . . I do not consider that it is a measure which can justifiably be recommended for use in the majority of hospitals in the tropics, nor for the practising physician of any country, in our present state of knowledge."

If the development of immunity is favoured by delaying treatment, it is an immunity against the infecting strain only, and will give little or no protection against other strains.

The Commission recommend different treatments for primary attacks and for relapses. They suggest that as there is little danger to the patient's life in a relapse he should be allowed to have several paroxysms before treatment is begun, and that the amount of this treatment should be small, in order that the natural process of pre-munition may not be interfered with. Colonel Sinton points out that a patient who returns with a malarial attack some time after the termination of treatment for the primary attack is not necessarily suffering from a relapse, it may be a fresh infection or superinfection with a heterologous strain or species of parasite. "If such a case be treated by the method which is recommended by the Commission as suitable for a recrudescence or a relapse . . . it may be too late to save the patient's life when proper treatment is instituted."

W. F.

RELAPSING FEVER AND OTHER SPIROCHAETOSSES.

SHRIMPTON (E. A. G.). **A Survey of the Incidence of Relapsing Fever in China.**—*Chinese Med. Jl.* 1936. Feb. Supp. No. 1. pp. 312–344. With 6 figs. (1 map). [25 refs.]

A general account of the epidemiology of relapsing fever in China based on data obtained in the "Survey of Hospital Patients" for 1933 and 1934, and also from hospital reports and references to the literature.

The disease has been reported from most of the provinces of China, but there are no well defined endemic areas. In typical areas a marked seasonal distribution is found with a maximum in May and June, but under abnormal conditions, such as famines, civil disturbances, overcrowding, etc., this maximum may occur in other months. The distribution shows an intimate connexion with temperature, probably correlated with changes in the clothing habits of the population in relation to climate. The disease is almost entirely confined to the lower grades of society where overcrowding and unhygienic surroundings are manifest.

There is a ratio of 4 males to 1 female, which is related to the degree of exposure to contagion resulting from the economic situation in the larger towns. The age distribution after 15 years shows a slightly higher expectation, probably due to the effects of different exposures to infection. No cases were recorded in infants under a year old, and from 1 to 15 they were relatively infrequent.

The lower incidence of the disease in the south may be ascribed to the smaller number of reservoirs of infection, and to the shorter period of favourable conditions for the spread of the vector.

A marked alteration in the number of reported cases each year is observed and it is suggested that this may be due to the immunity from infection lasting for only a short period. *E. Hindle.*

COLES (Alfred C.). **Observations on the Life-History of the Spirochaetes of Relapsing Fever.**—*Jl. Trop. Med. & Hyg.* 1936. Apr. 1. Vol. 39. No. 7. pp. 77–81. With 12 photomicrographs & 7 figs.

The author examined dried films of *Spirochaeta pallida*, *S. duttoni*, *S. vespertilionis*, *S. anserina* and also *S. buccalis* and other mouth spirochaetes, stained in various ways, and in all cases found evidence of the existence of small granules within the spirochaetes.

The air-dried films were fixed in alcohol and then stained in well-diluted Giemsa for 12, 24 and 48 hours respectively. After washing and drying, half the stained films were differentiated by dropping on a few drops of Orange-tannin and after allowing this to act for 15 minutes the preparations were washed in water. The films were examined both with ordinary and dark-ground illumination. In addition Burri's Indian ink method was used and found to show the existence of beads or dots in all the spirochaetes examined.

The author concludes from his observations that spirochaetes consist of a tube containing minute granules and that under certain conditions the wall of the organism bursts and the granules are discharged.

These infective granules would be so small that they would be almost indistinguishable from other minute granules present in the blood and tissues.

[BALFOUR and the reviewer* both described this process in the case of *S. anserina*, nearly 25 years ago, and the latter advanced a similar explanation of the so-called invisible infecting stage of spirochaetal infection (see this *Bulletin*, 1912, Vol. 1, p. 34).] E. H.

VINZENT (R.), SEGUIN (P.) & DAUFRESNE (M.). Technique d'isolement des spirochètes commensaux de l'homme. [A Technique for the Isolation of the Commensal Human Spirochaetes.]—C. R. Soc. Biol. 1936. Vol. 121. No. 5. pp. 406–408.

A modification of Noguchi's technique by means of which the authors have been able to isolate in pure culture various commensal spirochaetes from the human mouth, lungs, intestine and genitalia. The medium consists of one part of sheep serum mixed with three parts of nutrient agar, the mixture then being placed in tubes 11 mm. in diameter and 22 cm. long, each containing a piece of fresh sterile kidney from a guineapig, rabbit, or sheep. The nutrient agar is prepared as follows:—

Meat extract (500 gm. in a litre of water)	...	1,000 cc.
NaCl	... ..	5 gm.
Agar	... ..	15 gm.

adjusted to pH 8.

This medium can be used immediately and also preserves its properties for a month.

The tubes are inoculated by means of a capillary pipette passed down the centre of the medium to the neighbourhood of the piece of kidney, care being taken to avoid the formation of bubbles. The medium is then covered with a layer of sterile vaseline and kept at 37°C. About the 5th day or sometimes earlier, subcultures are made. The selected tube is cut across about 2 or 3 cm. above the piece of tissue and then by means of a pipette a small cylinder of the medium is isolated from the region between the path of the inoculation and the wall of the tube. This material can be examined by means of dark-ground illumination and if it contains spirochaetes is inoculated into a fresh tube in the neighbourhood of the kidney. This process is repeated indefinitely until the spirochaetes are separated from contaminating bacteria. Sometimes the process can be accelerated by passages in semi-coagulated serum containing kidney, to which is added 2 to 4 drops of a 1 per cent. solution of malachite green in each tube. The dye retards the multiplication of the bacteria without affecting the spirochaetes.

The separation of spirochaetes belonging to different species is more difficult and both biological and mechanical methods have to be employed. Some spirochaetes grow faster than others, and also the medium can be modified in various ways, such as by altering the pH, omitting the sterile tissue, using ascitic fluid instead of broth, etc. The mechanical methods follow the technique indicated by VEILLON for the isolation of anaerobic bacteria. E. H.

* HINDLE, E. (1912). *Parasitology*, Vol. 4. p. 463.

SEGUIN (P.) & VINZENT (R.). Étude systématique des spirochètes buccaux d'après les caractères de culture. [**A Systematic Study of Buccal Spirochaetes based on their Cultural Characteristics.**]—*C. R. Soc. Biol.* 1936. Vol. 121. No. 5. pp. 408-411.

The authors give the characteristics of the following species of buccal spirochaetes isolated in pure culture from the human mouth by the technique described above:—

S. microdentium Noguchi (1912); *S. ambigua* n. sp.; *S. commandoni* n. sp.; *S. skoliodontia* Hoffmann 1920; *S. trimerodonta* Hoffmann 1920 and *S. macrodentium* Noguchi 1912 (= *S. tenuis* Gerber). They were unable to obtain a pure culture of *S. buccalis*. E. H.

LI YUAN PO. Méthode de préparation simplifiée de mon milieu pour la culture du *Spirochaeta recurrentis*. [**A Simplified Method of preparing my Medium for the Culture of *S. recurrentis*.**]—*Ann. Parasit. Humaine et Comparée*. 1936. Jan. 1. Vol. 14. No. 1. pp. 76-77.

A modification of the original method of preparing this medium [see this *Bulletin*, 1933, Vol. 30, p. 366]. The yolk of an egg, of which the shell is previously sterilized with alcohol, is mixed thoroughly with 400 cc. of sterile 0.85 per cent. saline solution in a conical flask. The egg must be fresh and preferably with the shell of a dark brown colour. About 5 cc. of this mixture is added to each tube containing egg-white coagulated at 80°-85°C. for twenty minutes. The tubes are kept at 56°C. for two hours and then a layer of sterile paraffin is added. After cooling the tubes are ready for use in spite of their opacity. The medium has been found to give excellent results, especially with *S. recurrentis*, and one can count on 100 per cent. success in cultures from human blood if the operation is conducted aseptically. For subcultures it is necessary to add one or two drops of citrated blood to each tube.

E. H.

ADLER (S.), THEODOR (O.) & SCHIEBER (H.). **Transmission of Relapsing Fever by Ticks in Palestine.** [Correspondence.]—*Lancet*. 1936. Feb. 22. p. 448. Also in *Harefuah*. Jerusalem. 1936. Mar. Vol. 10. No. 3 (57). [In Hebrew. English summary p. 1.]

A recent investigation of a small outbreak of relapsing fever in Kfar Vitkin, south of Hedera in the coastal plain, showed that all infections could be traced to a cave infested with *Ornithodoros papillipes*. Ticks collected in the cave readily transmitted spirochaetes to rats in the laboratory. This tick produces a local analgesia while biting and coxal fluid and faeces are not excreted during feeding. The transmission, therefore, is obviously by the bite, and the authors were able to demonstrate the presence of spirochaetes in smears made from the puncture wounds both of a human subject and a rat bitten by infected ticks.

E. H.

KOHL (Glen M.) & COOLEY (R. A.). **Notes on the Occurrence and Host Relationships of the Tick *Ornithodoros talaje* in Arizona.**—*Public Health Rep.* 1936. Apr. 24. Vol. 51. No. 17. pp. 512-513.

Larval specimens of *Ornithodoros talaje* were collected on kangaroo rats (*Dipodomys* sp.) in an uninhabited region 40 miles southwest of (1816)

D

Aguila, Arizona, and nymphs and adults from soil removed from their burrows. Pocket-mice and jack rabbits in the same localities carried no ticks and therefore the authors suggest that in this region *O. talaje* may be distinctly limited in its host relationships. E. H.

LIPSTEIN (I.). Transmission de *Spirochaeta novyi* par *Pediculus corporis*. Contribution à la technique de l'élevage des poux. [The Transmission of *Spirochaeta novyi* by *Pediculus corporis*. Contribution to the Technique of rearing Lice.]—*Ann. Parasit. Humaine et Comparée*. 1936. Mar. 1. Vol. 14. No. 2. pp. 113-125. With 5 figs. on 1 plate. [23 refs.]

The author employs the usual leather "bracelet" method of feeding the lice contained in pill-boxes, but states that they live better if kept between meals in a glass jar over damp cotton wool in an incubator, at 35°C. during the night, and either at 24°C. or 35°C. during the day.

The lice were infected by feeding on the shaved ventral surface of a rat infected with *S. novyi*, but about 90 per cent. of the lice died after such a meal, animal blood being generally toxic to them.

The spirochaetes in the gut of the lice were found to become immobile after about 3½ hours and soon disappeared. After 24 hours no trace of them could be found in the body of the lice.

Infected lice were ground up and inoculated into rats at varying intervals. They were found to be virulent 24 hours and 7, 8 and 9 days after the infective meal, but after 48 hours and 5 days were not virulent. It is curious that when the spirochaetes were inoculated directly from one rat to another the infection was always fatal, but the infections produced by the emulsions of lice were generally benign. E. H.

SERGEANT (André). Passage dans le lait du spirochète de la fièvre récurrente hispano-africaine (souche algérienne). [The Passage in the Milk of the Spirochaete of Spanish-African Relapsing Fever (Algerian Source).]—*C. R. Soc. Biol.* 1936. Vol. 122. No. 17. pp. 213-214.

Four guineapigs were infected with an Algerian strain of *S. hispanica* and at the height of the infection their milk was collected and inoculated subcutaneously into a series of guineapigs, all of which developed the disease.

Although the infection was thus shown to be present in the milk of all four animals, spirochaetes were never found in the milk by microscopical examination. Out of the seven young guineapigs which fed on this infected milk only one developed the disease, after an incubation period of 14 days. E. H.

KRÖBER (Friedrich). Einige seltene Beobachtungen bei afrikanischem Rückfallfieber. [A Few Notes on African Relapsing Fever.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Apr. Vol. 40. No. 4. pp. 160-165.

The author gives two examples of intra-uterine infection with relapsing fever. In the first case the mother developed the disease the day after her child was born. The infant, although healthy at birth and its blood negative, 5 days later was found to be heavily infected with spirochaetes and in spite of treatment succumbed to the disease. In

the second case the infant was born of an infected mother and its blood remained negative, but on the third day it became unwell and as a precautionary measure was treated with myosalvarsan. The following day the child was better and remained well and the author reasonably assumes that it had probably been infected at birth and the treatment arrested the development of the disease.

With regard to cases in which patients show recurrence of attacks within a few weeks of receiving a course of treatment, the author adduces evidence to show that these must be regarded as new infections, rather than examples of the development of salvarsan-resistant strains of spirochaetes.

Finally, the immunity problem is briefly discussed, and it is considered that treatment prevents the full development of any immunity against the infection; but, nevertheless, it is generally inadvisable to delay treatment as occasionally the disease may be rapidly fatal.

E. H.

CALWELL (H. G.). **A Case of Congenital Relapsing Fever.**—*East African Med. Jl.* 1936. Feb. Vol. 12. No. 11. pp. 347-348.

The record of a case of infection with *S. duttoni* in a child, who developed the disease on the ninth day after birth and died on the 12th day. The mother showed symptoms of the disease on the third day of the puerperium, and since the infant was not at any time exposed to the bites of infected ticks, the infection seems to have reached the child either through the placenta or in some other way during parturition.

E. H.

SERGEANT (André). Caractères pathogènes d'une souche algérienne du spirochète de la fièvre récurrente hispano-africaine. [**The Pathogenic Characters of an Algerian Strain of Spanish-African Relapsing Fever.**].—*C. R. Soc. Biol.* 1936. Vol. 121. No. 14. pp. 1520-1522.

An experimental study of an Algerian strain of *Spirochaeta hispanica*; various animals were inoculated subcutaneously, in order to determine their susceptibility to this infection.

The pig, donkey and cat were found to be refractory but the other animals tested were susceptible in varying degrees. The guineapig is regularly infected and always shows an acute febrile attack followed by a chronic state of infection. The rabbit, 17 out of 18 infected, shows a similar type of infection to the guineapig, but the parasites are present in the blood for a shorter time and in fewer numbers. The white mouse becomes infected after 24 hours' incubation, but the attack is of short duration and the animals recover. Monkeys showed an attack of 4 to 5 days and in 1 out of 3 cases there was a relapse 10 days later which lasted for 5 days. Five out of 6 dogs were infected; two young ones showed spirochaetes in the blood for 2 and 7 days respectively; the adults showed latent infections. The fowl is also susceptible but shows no obvious spirochaetes in its blood. Nevertheless its blood becomes infective to guineapigs after about 5 days' incubation and this infectivity persists for about 3 weeks.

E. H.

SERGEANT (André). Épreuve de la prémunition croisée appliquée à quelques souches algériennes de spirochétose hispano-africaine. [**Cross-Immunity Tests applied to Various Algerian Strains of Spanish-African Relapsing Fever.**]—*Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 245-251. With 2 figs.

The author made cross-immunity tests with 3 Algerian strains of *Spirochaeta hispanica* in guineapigs. One strain had been isolated from a human case of infection at Chiffalo, a second from *Rhipicephalus sanguineus* in the same locality, and both strains had been kept in the laboratory for two and a-half years. These two were found to be serologically identical. A third strain, isolated from a human case in another district only 3 months previously, belonged to the same species, but was more virulent. E. H.

SERGEANT (André). Emploi thérapeutique du sérum de convalescents de fièvre récurrente hispano-africaine. (Étude expérimentale.) [**The Therapeutic Use of Convalescent Serum in Spanish-African Relapsing Fever. An Experimental Study.**]—*Bull. Acad. Méd.* 1936. Mar. 17. 100th Year. 3rd Ser. Vol. 115. No. 11. pp. 463-467.

The author has studied the value of convalescent serum both for protection and treatment using guineapigs infected with *Spirochaeta hispanica*. This is an ideal animal to use, for out of 1,100 guineapigs inoculated with this strain, not one has been refractory to the infection.

In one series of experiments 5 cc. of convalescent serum was injected into guineapigs either the day before, the same day, or the day following the inoculation of spirochaetes. In all three groups the serum prolonged the incubation period and attenuated the attack, but on the other hand the infection was prolonged with many small relapses.

With regard to the curative action, out of 71 infected guineapigs 25 were left untreated and the remaining 46 inoculated with convalescent serum either the first, second, third or fourth day of the attack. In all cases the serum caused a sudden fall in temperature and the number of parasites within 24 to 36 hours. The effect was most marked on the third day of infection when the average duration of spirochaetes in the blood was reduced to an average of only 1.5 days, as compared with 8 days in the controls.

Convalescent serum collected from guineapigs after the end of the first attack was found to be more effective than after several weeks. The action was found to be proportional to the dose injected and better results were obtained by giving a single large dose, than a number of small doses.

From these results the author is of the opinion that human cases of this disease should be treated by means of convalescent serum, for this infection does not respond to arsenical treatment and the disease is often serious, with many relapses. E. H.

RESSELER (R.). Action thérapeutique de la chrysobiase dans la spirochétose de Dutton chez les souris. [**The Therapeutic Action of Chrysobiase on *Spirochaeta duttoni* in Mice.**]—*Ann. Soc. Belge de Méd. Trop.* 1935. Dec. 31. Vol. 15. No. 4. pp. 541-549.

The description of the action of a new gold compound, Chrysobiase, prepared by the Union Chimique Belge, which whilst considerably less

toxic than solganal and soganal B [see this *Bulletin*, 1932, Vol. 29, p. 563] possesses a similar therapeutic index, 1 : 50, against *S. duttoni* infection in mice. The author recommends its use for the treatment of African tick fever. E. H.

VAUCEL (M.). Le séro-diagnostic de Martin et Pettit au Tonkin (résultats de 800 séro-agglutinations). [**Martin and Pettit's Serum Diagnosis at Tonking (the Results of 800 Serum Agglutination Tests).**]—*Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 251–257.

Although since 1934 only 4 cases of Weil's disease have been diagnosed at the Tonking hospital, the results of serum agglutination tests suggest that infection with *Spirochaeta icterohaemorrhagiae* may be much more common than is generally supposed.

The patients showing characteristic symptoms all agglutinated in dilutions of 1 : 10,000 to 1 : 12,000. 193 patients in which the disease was suspected gave positive agglutinations in 10 cases with average dilutions of 1 : 1,300. 252 sera of patients with undetermined febrile infections gave 7 positive results with average dilutions of 1 : 1,300. 297 sera forwarded for Wassermann tests gave 13 positive results with average dilutions of 1 : 930. 54 sera from cases of pyomyositis gave 12 positive reactions, a result which is considered to suggest that leptospiral infection may play some part in the aetiology of tropical myositis.

The sera of 15 dogs gave uniformly negative results. E. H.

MEYER-MAY (J.) & VAUCEL (M.). La spirochétose ictéro-hémorragique est-elle responsable de certaines myosites tropicales. [**Is Spirochaetal Jaundice responsible for Certain Tropical Myositis ?**]—*Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 257–263.

A detailed account of the results of agglutination tests against *S. icterohaemorrhagiae* of the sera of 54 cases of tropical myositis, of which 12 were positive. [See above.] E. H.

MARTIN SANCHEZ (Antonio). Las espiroquetosis humanas en las Islas Canarias. Espiroquetos en esputos, orina y sangre. A proposito de quince observaciones. [**Human Spirochaetosis in the Canary Islands.**]—*Medicina Paises Calidos.* Madrid. 1936. Mar. Vol. 9. No. 3. pp. 105–124. With 7 figs. [38 refs.]

The author describes and gives brief clinical notes of 14 patients who were found to have spirochaetes either in their sputa, the peripheral blood or the urine, or in more than one of these. Their presence in sputum had been previously noted, but otherwise these cases are claimed to be the first recorded in the Canary Isles. Jaundice was present in 3 only, fever was not found in 5. The most common symptom was pain, in the abdomen or over the liver, varying in degree ; it was complained of in 12 of the 14 ; spirochaetes were found in the circulating blood in 10, in the sputum in 8, in the urinary deposit in 6 ; in all three in one patient, in blood and sputum in 6, in blood and urine in 4. The subjoined table, adapted from the original, shows clearly the combination of symptoms and signs present in each patient, and its reproduction here will render any detailed clinical account unnecessary. The local

rats were found to harbour *Sp. icterohaemorrhagiae* and some of these 14 cases were instances of Weil's disease possibly contracted indirectly from these animals.

H. H. S.

Symptoms	Cases														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Jaundice	•					•						•			= 3
Fever	•				•	•	•	•	•	•	•	•			= 9
Pain	•	•	•		•	•	•	•	•	•	•		•	•	= 12
Haemoptysis	•	•		•		•	•								= 4
Haematuria						•		•				•		•	= 4
Hepatomegaly						•						•			= 2
Splenomegaly						•									= 1
Spirochaetes in sputum	•	•		•	•	•	•		•		•				= 8
Spirochaetes in circulating blood	•	•	•		•	•		•	•	•	•			•	= 10
Spirochaetes in urinary deposit			•			•		•		•			•	•	= 6
Blood not examined for spirochaetes				•			•						•		= 3
Spirochaetes found in association with T.B.					•										= 1
Spirochaetes found in association with <i>B. fusiformis</i>									•						= 1
Spirochaetes not found												•			= 1

Chart of symptoms of 14 patients with spirochaetosis in the Canary Islands
[Illustrating MARTIN SANCHEZ' paper from *Medicina Paises Cálidos*]

PRETO (Giacomo). A proposito di un bambino portatore di leptospire dell'ittero emorragico. [*Weil's Disease in a Child.*—*Pathologica*. 1936. Apr. 15. Vol. 28. No. 534. pp. 171-180. With 2 figs. & 1 chart. [30 refs.] English summary (8 lines).

The patient was a boy of 8 years. No history was obtained except that three years before he had suffered from "haemorrhagic nephritis following impetigo" and was cured after two months' treatment. The present illness started two days before he came to the clinic, with fever 39°-40°C., headache, efforts at vomiting, and diarrhoeic stools 8-10 in the day. The liver was enlarged to 2 cm. below the costal margin. The urine was clear, with a slight trace of albumen. Blood culture was negative; ascaris ova were seen in the faeces. There was a profuse epistaxis on the second day in the clinic; the temperature fell to normal on the sixth day. There was no jaundice. Examination of the urinary

deposit revealed numerous leptospira. Inoculation into a guineapig resulted in death with the typical findings of Weil's disease. Moreover, the child's serum agglutinated the leptospira markedly in 1 : 100 and to a certain degree in 1 : 300.

H. H. S.

RAT-BITE FEVER.

HIDAJAT (M. D.) & ESSED (W. F. R.). Een geval van rattebeetziekte, waarbij de prophylactische inspuiting van neosalvarsan gefaald heeft. [**A Case of Rat-Bite Fever. Failure of Neosalvarsan as a Prophylactic.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1936. May 5. Vol. 76. No. 18. pp. 1133-1136. With 3 figs. on 1 plate.

The case recorded is a straightforward one, but worth recording because a fairly large dose of neosalvarsan injected on the day following the bite failed to prevent the onset of symptoms. The patient was a boy of 9 years bitten by a rat on the upper lip during sleep. The following day 200 mgm. of neosalvarsan were injected intravenously, but symptoms came on a fortnight later. Inoculation of the child's blood subcutaneously into mice reproduced the disease.

H. H. S.

COLE (Arthur F.). **Rat-Bite Fever from a Kitten.**—*Brit. Med. Jl.* 1936. Mar. 28. pp. 638-639.

The description of a typical case of rat-bite fever in a patient who became infected after being scratched and bitten in the finger by a sick kitten. The patient was treated for septic lymphangitis for three months before the nature of the disease was recognized, and confirmed by inoculation of gland tissue into a guineapig. During this period the patient had 10 to 12 attacks of fever, and a profuse development of hair had taken place on the right forearm and dorsum of the hand and fingers. The case was treated successfully with intravenous injections of neokharsivan.

E. Hindle.

LAVERICK (J. V.). **Rat-Bite Fever from a Cat.**—*Brit. Med. Jl.* 1936. Mar. 28. pp. 639-640.

A similar case to the one recorded above. The patient developed a typical clinical history of rat-bite fever after being severely bitten by a cat. The causative organism was not isolated but the patient was cured by a course of injections of neokharsivan.

E. H.

BLANC (G.) & NOURY (M.). Infection du merion (*Meriones shawi* Lataste) par le *Spirillum minus* Carter. [**The Infection of a Merion (*Meriones shawi* Lataste) with *Spirillum minus* Carter.**—*Bull. Soc. Path. Exot.* 1936. Apr. 1. Vol. 29. No. 4. pp. 383-388. With 3 figs. [30 refs.]

The record of a case of spontaneous infection with *Spirillum minus* in a merion, *Meriones shawi*, from Marrakech. The infection was discovered when making passages in guineapigs with the blood of this animal. Only after four passages in guineapigs were spirilla discovered, but the animals in the earlier passages showed pathological changes characteristic of this infection in guineapigs.

The merion, therefore, can be added to the long list of rodents and other animals which may be infected with rat-bite fever.

E. H.

KNOWLES (R.), DAS GUPTA (B. M.) & SEN (S.). **Natural *Spirillum minus* Infection in White Mice.**—*Indian Med. Gaz.* 1936. Apr. Vol. 71. No. 4. pp. 210–212. With 1 chart & 1 fig.

An examination of 31 white mice originally received from the Central Research Institute, Kasauli, and subsequently kept under conditions precluding the possibility of any rat reaching them resulted in the discovery that 15, or 48 per cent., showed natural infection with *Spirillum minus*. The strain was isolated and shown to be pathogenic to man by inoculating a volunteer who subsequently developed rat-bite fever.

This observation shows that the white mouse may not be a reliable animal for blood inoculation in testing for *Spirillum minus* and the guineapig may be more suitable, for no infection was found in the first 20 individuals examined. E. H.

STROESCO (G.). Le mode de transmission et de propagation de la spirochétose provoquée par le *Spirochaeta muris*; son organotropisme. [The Method of Transmission and Spread of Spirochaetosis caused by *Spirochaeta muris*; its Organotropism.]—*C. R. Soc. Biol.* 1936. Vol. 121. No. 7. pp. 619–621. With 2 figs.

An examination of the urino-genital glands of male and female mice infected with *Spirillum minus*, by means of Dieterle's impregnation method, has shown that these organisms have a preference for the vesiculæ seminales and Bartholin's glands. The examination of 34 males and 6 females showed massive infections of these organs, up to as many as 100 spirilla in each microscopic field in the case of the older animals. The organisms occur not only in the contents of the vesiculæ seminales but also in the glandular cells of the walls. Other parts of the genital system remain negative. In females, Bartholin's glands are always positive and the infection is often present in the periglandular tissue, especially in lactating individuals. During lactation the spirilla leave Bartholin's glands and by means of the blood system reach the mammary glands where they multiply and can infect newborn animals [see this *Bulletin*, 1934, Vol. 31, p. 855]. The infection can also be transmitted during copulation.

In view of the predilection of *S. minus* for these glands, their secretion seems to offer an optimum medium for their culture *in vivo*. E. H.

MONTEL (R.) & TRUONG-VAN-QUE. Traitement du sodoku par les sels de bismuth. [The Treatment of Sodoku by Bismuth Salts.]—*Bull. Soc. Path. Exot.* 1936. Jan. 8. Vol. 29. No. 1. pp. 33–35.

The authors have treated two cases of this disease by means of injections of Bivatol and both were completely cured after four intramuscular injections, at intervals of 3 to 4 days. A third case, also an Annamite, had been treated by intravenous injections of novarsenobenzol, up to a dose of 0.45 gm., but the course did not prevent a relapse which developed ten days after completion of the arsenical treatment. A course of Muthanol was given, which at once arrested the development and effected a complete cure.

The authors recommend the use of these bismuth salts, in place of arsenicals, as being more convenient and less dangerous than treatment by novarsenobenzol. Moreover they seem to be more efficacious.

E. H.

DYSENTERY.

AMOEBIC.

SECKINGER (D. L.). **The Epidemiology of *Endamoeba histolytica* Infection in Two Rural Georgia Counties.**—*Southern Med. J.* 1936. May. Vol. 29. No. 5. pp. 472-477. [23 refs.]

The area investigated lies about 50 miles north-east of Atlanta City, in Barrow and Walton Counties. The enquiry started in the town of Bethlehem in which dwell 42 families, all white. Water is obtained entirely from surface wells; sewage disposal consists of open privies, flies are abundant and houses are not screened. Among the 117 residents one active case of dysentery and 13 cyst passers were detected; all but one was discovered at the first examination, so the infection rate is at least 12 per cent. Cases in Bethlehem started after the immigration of two women who had contracted infection outside, the previous year. The area of enquiry was therefore extended. In Barrow County 332 individuals in families giving a history of dysentery were examined, and 66 or 20 per cent. were passing *E. histolytica*, 12 or 8.2 per cent. in vegetative form and the others the cystic. In Walton County 73 were positive out of 189, or 38.6 per cent. Thus in these two counties, and excluding Bethlehem, 129 were positive among 521 persons examined. Nearly one-third, 40, were in the 5-14 year group. In many instances there was more than one infected in a family. In 31 families in Barrow County 74 persons were positive, and 88 in 38 families in Walton County. In one large family of 11 persons, only one was negative, a child of 3 years. Further investigations showed that the family food-handler was at times the source of the spread, but a very potent factor was contamination of food by flies.

H. H. S.

KOITER (D.). Mededeeling uit de practijk. [**Amoebic Dysentery in a Dog.**]—*Nederl. Indische Bladen v. Diergeneesk.* 1936. Apr. Vol. 48. Nos. 1 & 2. pp. 87-89. English summary (5 lines).

A dog in Bandoeng was observed to be passing stools containing blood and mucus. Faecal examination revealed abundant *Trichomonas*, but no hookworms. A specimen, however, sent to the Pasteur Institute was reported to contain a few *ancylostome* ova, very many *Trichomonas* and numerous vegetative forms of *Entamoeba*. It was treated with emetine hypodermically and by Yatren 125 mgm. and rivanol 10 mgm. by mouth thrice daily and was cured. This is said to be the first certified case of amoebic dysentery in a dog in the Dutch East Indies.

H. H. S.

WAGNER (Oskar). Experimentelle Untersuchungen ueber Amöbenruhr. I. Teil. Krankheitsverlauf bei künstlicher und spontaner Uebertragung der Amöbiasis im Versuchstier. [**Course of the Disease in Experimental Amoebic Dysentery.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1935. Vol. 39. No. 1. pp. 1-48 (1-48). With 6 figs. [84 refs.]

BIELING (Richard). Experimentelle Untersuchungen ueber Amöbenruhr. II. Teil. Die experimentell erzeugten Veränderungen

und die Pathogenese der Amöbiasis. [Pathology of Experimental Amoebic Dysentery.]—*Ibid.* No. 2. pp. 49–108 (1–60). With 29 figs. [49 refs.]

These two papers describe the results of investigations carried out at Frankfurt on a strain of *Entamoeba histolytica* which was isolated in Hamburg from a case of human amoebiasis by rectal inoculation of a kitten. The strain was maintained for a period of 8 years, during which several thousand cats and several hundred dogs were infected. The work was undertaken primarily with the object of carrying out chemotherapeutic studies on amoebic dysentery, but the very large series of animals used has enabled conclusions to be drawn regarding the susceptibility of animals, the variation in virulence of the amoebic strain, the pathology of experimental infections and a number of other important questions relating to the dysentery amoeba.

The first paper deals with the experimental side of the subject. It is noted that the routine method of infecting animals was by the injection into the colon, through a rubber rectal tube, of saline washings from the large intestine of an infected animal. The washings were obtained by injecting and withdrawing warm saline solution by means of the tube and syringe apparatus. Owing to the failure of some animals to become infected at the first injection, in spite of abundance of amoebae in the material used, it is necessary, in order to avoid losing the strain, to inoculate several animals at each passage. There were very marked differences in the type of infection produced, which varied from the acutest form of dysentery to a purely carrier condition. If the number of animals used had been small it would have been possible to interpret these differences as due to changes in virulence in the strain of amoeba employed. It became clear, however, as the work proceeded that the virulence had remained unchanged and that the differences noted were due to variations in the susceptibility of the animals. Young animals were generally more susceptible than old ones, amongst which occurred cases of infection without symptoms, in which only small amoebae ("minuta" forms) without included red blood corpuscles were to be found. Injection of these "minuta" forms into other cats was capable of giving rise to severe dysentery associated with the presence of large amoebae, with included red blood corpuscles, of the typical *E. histolytica* type. Young dogs were, as a rule, more susceptible to rectal injection than cats, though kittens under 1,000 grams in weight never failed to acquire a fatal infection. With increase in age and weight the susceptibility decreased more rapidly in the case of dogs than in the case of cats. Over a period of 8 years it was noted that the susceptibility of the animals was generally higher during the hot summer months than during the winter, a feature which appears to be correlated with the recognized greater severity of human amoebic infections in hot countries. Such seasonal fluctuations in the susceptibility of the animals emphasize the difficulty there is in attempting to establish distinct species of dysentery producing amoebae, such as *E. dispar*, on biological grounds alone.

Some evidence was obtained that in cats after two or three separate infections a certain degree of immunity was produced. In dogs there was little indication of such an acquired immunity, as these animals appeared to be more liable to repeated infections than cats. Amoebic abscess of the liver, with or without associated bacterial or trichomonas infection, was fairly common in cats but occurred only once in the dog.

Repeatedly it was observed in dogs that the infection of the large intestine induced by rectal injection of infective material spread to the small intestine, while in two instances amoebae were found in the stomach, associated in one of the cases with gastric ulceration. Occasionally dogs, but never cats, became infected accidentally by contact with infected animals. It was found that typical acute amoebiasis could be produced in both cats and dogs by feeding them with amoeba-containing material from such spontaneously infected animals. In general, cats and dogs could be readily infected by introducing cyst-free material from rectally infected cats and dogs into the stomach through an oesophageal tube. In these cases the infections induced were typical ones of the large intestine. Both cats and dogs were infected by administering orally cysts from human cases, but with much longer incubation periods than was the case when amoebae were injected directly from animal to animal.

The second paper deals with the pathology of the experimental infections in cats and dogs, and is illustrated with a number of photographs showing the condition of the intestine and the lesions produced. In a series of 695 cats in which infection followed a single rectal injection, one-third showed amoebae in the faeces after an incubation period of two days, while three days later the great majority of the animals were passing amoebae. In a few of the animals there was a longer incubation period, up to 20 days, and in these cases it is noteworthy that when well established the disease was as severe as in animals showing an incubation period of only two days. Except in the case of a few of the larger animals death occurred in a few days. Following both rectal and oral administration of infective material two points of the large intestine are first attacked, namely the lower part of the large intestine immediately above the anal ring and the region just below the ileo-caecal valve. This primary localization applies both to cats and dogs. It is interesting to note that after the administration of certain dyes the staining of the mucosa is most intense at these two points, an indication that it is here that stasis occurs. The first change in the intestine is the appearance of small punctiform haemorrhagic necrotic areas. These gradually extend and become confluent. It would appear that the amoebae which accumulate and even reproduce at the two sites mentioned give rise to a substance injurious to the mucous membrane. The superficial epithelium including the distal part of the crypts is thrown off, leaving exposed both the openings of the crypts and the intervening connective tissue. Amoebae appear to enter the tissues in three ways. They pass directly into the exposed connective tissue, into the crypts or into the opened up lymph channels, whence they migrate to the lymph follicles and the sub-mucosa. Lodged in the tissues or in the crypts, the amoebae multiply and, by virtue of a poison or toxin, produce zones of necrosis which increase in extent and unite with other similar zones. The intestinal mucosa responds to the invasion by the increased production of mucus which, mixed with blood, forms an excellent medium for the development of amoebae on the surface of the intestine. This mucus, spreading over the mucosa, leads to fresh invasions and ultimately, it may be, to amoebic necrosis of the entire surface of the mucosa of the large intestine. In cats the ileo-caecal valve forms a definite barrier to extension of the invasive process but in dogs this is not so, for infection of the small intestine in varying degree is of common occurrence.

During their development in the tissues the amoebae bring about destruction of lymphatics and capillaries, with the result that amoebae may enter these vessels and make their way to the lymphatic glands and the liver. In sections of the liver the amoebae can sometimes be seen in the capillaries. By multiplication and toxin production a coagulation necrosis of the liver tissue is produced, leading to the characteristic liver abscess. It is noteworthy that though the tissue necrosis evidently results from the local action of a poison or toxin elaborated by the amoebae, it is not very evident that this toxin has more than a purely local effect, for dogs which have had extensive involvement of both the large and small intestine have during the course of some weeks shown no symptoms of generalized toxæmia. Though the course of infection in dogs is very much the same as in cats, in dogs the involvement of the mucosa is generally more superficial, while very characteristic of these animals is the production in the large intestine of distinct ulcers clearly separated from one another by relatively healthy mucosa. In consequence of the more superficial nature of the infection in dogs passage of the amoebae into the blood vessels and production of liver abscess are less commonly observed than in cats. As the disease in dogs is less acute than in cats, spontaneous recovery is more common, though, as in cats, relapses may occur. In spite of the fact that symptoms of general toxæmia are not evident there undoubtedly occurs some absorption of toxins, for a condition of allergy is developed in dogs which have suffered from chronic infections. This is made manifest by the specific skin reaction following injection of amoebic antigen prepared from the heavily infected mucosa of a cat or dog. An emulsion of the mucosa is digested for about 5 weeks with *Bacillus mycoides*, with a view to destroying the proteids. The resulting digest is centrifuged after the addition of formalin 0.02 per cent. when a clear solution having antigenic properties is obtained. The skin reaction takes the form of a rapidly developing nodule surrounded by a red area. In cats it was not possible to obtain the reaction, probably because the disease in these animals is not of sufficient duration. Whether this test and complement fixation will prove to be of use for the diagnosis of human infections future work alone will show. Such are a few of the many interesting points brought out by this extensive and carefully conducted investigation on experimental amoebiasis in animals. The two papers should be carefully studied by all those who contemplate embarking upon similar work.

C. M. Wenyon.

KUBO (Michio). **Investigations on Amoebic Dysentery. IV. Experimental Studies of Amoebic Dysentery in Dogs. (Second Report.) Amoebic Dysentery of Dogs in Chronic Stadium and the Significance of Dogs in the Spread of this Disease.**—*Jl. Oriental Med.* 1936. Apr. Vol. 24. No. 4. [In Japanese pp. 739-755. With 5 figs. on 1 plate. [45 refs.] [English summary pp. 47-48.]

Examination of 85 street dogs caught in Mukden showed 7 of them to be infected with *E. histolytica* and 2 were cyst-passers. Dogs infected experimentally were examined at intervals of 11 to 40 days after infection, *i.e.*, in what was regarded as the chronic stage [though this appears to have been arbitrarily selected]. Some were then passing typical dysenteric stools containing blood and mucus, others had stools apparently normal but with small quantities of mucus in which the amoebae

could be seen. Post-mortem examination showed, of course, in the acute stage erosions and ulcers; these were sometimes visible in the "chronic" stage, but some showed no macroscopic lesions. Amoebae might be found in the lumen without indications of invasion of the gut wall.

H. H. S.

CARBONELL Y SALAZAR (A.) & SANCHEZ SANTIAGO (B.). Absceso hepático de una niña de catorce meses. [**Liver Abscess in a Child of Fourteen Months.**] *Archivos Med. Infantil.* 1936. Apr., May-June. Vol. 5. No. 2. pp. 143-151. With 4 figs. [13 refs.] English summary.

The child, a little girl of 14 months, had been suffering, 20 days prior to admission to hospital, from dysenteric symptoms, diarrhoea and passage of blood and mucus with high fever. These symptoms improved but the general condition did not and a swelling in the mid-axillary line at the level of the base of the right lung called for prompt admission. X-ray and puncture with withdrawal of greenish-yellow fetid pus confirmed the suspicion of abscess. The swelling could be completely reduced by steady pressure. Operation was performed and the child recovered. Repeated examination failed to reveal *E. histolytica*; Gram-negative bacilli and Gram-positive diplococci were found, and the abscess appeared to arise via the portal radicles, but the actual causal organism was not determined.

H. H. S.

MOTTA (Orlando Cabral). Abscesso amebico do pulmão. [**Amoebic Abscess of the Lung.**]—*Brasil-Medico.* 1936. Apr. 4. Vol. 50. No. 14. pp. 294-299. With 4 figs. & 1 chart. [10 refs.]

The patient was a woman of 28 years. Some time before [how long is not known with certainty] she had suffered with dysenteric symptoms—colicky pain, diarrhoea, passage of blood and mucus. When she came under the author's care she presented signs and symptoms of abscess of the right lung, shown to be amoebic. The radiograms showed that the lower part of the lung was not affected; there was a zone of normal lung between the diaphragm and the lower limit of the abscess. Emetine was given by intramuscular injections and also 10 cc. ampoules of 10 per cent. hyposulphite of sodium daily, 20 cc. of 50 per cent. hypertonic glucose twice daily, and neosalvarsan, all intravenously. Death occurred suddenly 23 days after admission. [No operative measures are reported.] From the situation of the abscess the author concludes that the entamoeba did not pass from the liver, *via* the diaphragm, but by the vascular route. If a post-mortem examination was made, there is unfortunately no account of the findings.

H. H. S.

BÄSSLER (Anthony). **Intestinal Obstruction due to Amebiasis.**—*Jl. Amer. Med. Assoc.* 1936. June 6. Vol. 106. No. 23. pp. 1965-1968. With 3 figs. [12 refs.]

The patient, a man of 50 years, complained of abdominal cramps and occasional passage of blood after taking laxatives. Sigmoidoscopic

examination revealed inflamed areas and vegetative forms of *E. histolytica* were found. The amoebae disappeared after the patient received chiniofon and he gained 30 lbs. in weight. Cysts were seen occasionally afterwards, and 8 months later symptoms returned and the amoebae were again present. Treatment by carbarsone and later by vioform again was followed by improvement, but a year later he had complete intestinal obstruction with faecal vomiting necessitating urgent operation and an "annular neoplasm" was reported at the rectosigmoid junction. Caecostomy was done and 5 weeks later this wound became inflamed and started to slough and amoebae were found in the edges of the wound. The time from infestation to complete obstruction was 22 months.

Other authors have reported neoplasms of amoebic origin or inflammatory masses secondary to amoebic ulceration, and due to secondary bacterial invasion in many cases. The lesion in the present instance proved to be entirely intra-enteric and cleared up on prolonged anti-amoebic treatment by vioform, emetine, carbarsone and chiniofon by mouth and by enema through the colostomy wound. H. H. S.

GOLOB (Meyer). **Oxygenation in Relapsing Amebiasis. Report of Case.**—*Jl. Amer. Med. Assoc.* 1936. May 16. Vol. 106. No. 20. pp. 1725-1726.

Felsen in 1931 advocated a process of intestinal oxygenation for treatment of ulcerative colitis. The patient whose case is recorded here suffered from amoebic dysentery and to all appearances recovered after treatment with emetine and arsenicals. Two and a-half months later the symptoms returned and in a severe degree. Entamoeba cysts were found but no vegetative forms and the condition proved resistant to various methods of treatment and the patient was rapidly going downhill. The author regarded the case as one of "secondary ulcerative colitis, based on a mucosa made vulnerable by the amoeba, an environment in which even normal colonic dwellers, saprophytes, become virulent and pathogenic." Oxygen was administered *per rectum* in the dosage shown in the attached table, during the hours 8 a.m. to 8 p.m., the dosage and frequency being governed by the tolerance of the patient. Castor oil was given at night and seemed to enable the patient to tolerate better the distension caused by the oxygen. Improvement was rapid, the patient leaving hospital on August 17th, less than 3 weeks from the start of the oxygenation. H. H. S.

Oxygenation Administered.

Date						Minutes	Bubbles per minute
July	23,	1935	...	...	...	160	20
"	24	"	...	...	...	160	20
"	25	"	...	...	...	240	40
"	26	"	...	...	...	120	20
"	27	"	...	...	...	180	20
"	28	"	...	...	...	180	20
"	29	"	...	...	...	240	20

Total : 21·33 hours ... Approximately 6½ liters.

BACILLARY ; BALANTIDIAL ; GIARDIASIS.

WILSON (D. A. O.). **An Outbreak of Dysentery due to *B. dysenteriae* Flexner Type P288.**—*Jl. Roy. Army Med. Corps.* 1936. Mar. Vol. 66. No. 3. pp. 191–192. [Summary appears also in *Bulletin of Hygiene.*]

In June of last year among 43 men of the Indian platoon of the 1st Battalion the K.R.R.C., stationed at Mingaladon [the paper does not state where in India Mingaladon is situated, and the name is not mentioned in the Times Atlas], 9 were attacked with dysentery; one British soldier was also infected. Six of the cases were mild, but the symptoms were typical, and 4 were of moderate severity. An organism giving the biochemical reactions of *Bact. dysenteriae* Flexner was isolated from all and in 8 of them in almost pure culture. It rendered glucose, mannite and dulcitate acid, without gas production. It was, however, not agglutinated by the "classical" Flexner antiserum but with subgroup B antiserum and in low titre (1 : 25) with subgroup A 2 antiserum, with one exception. Subcultures of all the strains were sent to the Meerut laboratory where they were identified as Type P288. BOYD, J. S. K. described it in 1932 [see *Bull. of Hyg.*, 1935, Vol. 10, p. 124] and the evidence in favour of its pathogenicity is strengthened by the facts that it was isolated in every case, was present in many in almost pure culture, and agglutinins against it were found in the serum of one of the patients.

The author states that the source of the outbreak was not discovered, but he makes a fairly shrewd guess in saying that the Indians' latrine was only 6 yards from the door of the cook-house, that the soil outside was probably contaminated by the men washing at a tap after defaecation and that the cooking utensils were cleaned with sand from this area. The outbreak, which occurred from the 4th–16th June, ceased as soon as the practice was stopped.

H. H. S.

MURASHIMA (Tetsuo). **An Epidemiological Observation of the Dysentery Epidemic which occurred in Kawasaki City.**—*Jl. Public Health Assoc. Japan.* 1935. Sept. Vol. 11. No. 9. pp. 1–5. [Summary appears also in *Bulletin of Hygiene.*]

In January 1935 an explosive outbreak of dysentery occurred in Kawasaki City, a town of 150,375 inhabitants, contiguous to Yokohama. The previous incidence of dysentery was 1·1 per 10,000 and 4·5 for Yokohama. There are two water supplies, a larger at Tode estimated for 100,000 persons and a smaller at Nakahara. Night soil is removed by contractors and used as fertiliser.

The first case was reported on 31st December, 1934; thence on successive days 16, 143 and 112, after which notifications fell, but the total by the end of the month was 1,357 or 9·0 per thousand inhabitants. Of the total 32,685 households 1,106 were attacked. In 922 there was one case only, in 135 two, in 40 three, in 7 four, in one there were 5 and in another 11 cases [these total 1,356]. Forty-eight of 67 districts into which the city is divided were attacked. The fatality rate was 22·7 per cent. among 2-year-old children, 19·2 for the 3-year-old, 22·0 for 4-year-old. More than one type of *Bact. dysenteriae* appear to have been concerned, those mentioned are the Shiga, the Nishiura and the Kawasaki organisms, but the latter are not further defined.

In a second section of the paper, the mode of infection of 449 patients is mentioned ; 160 were infected through food, 201 by water, and 88 by contact. Bacteriological examinations of the water sources showed *Bact. coli* to be present in all and "occasionally in the water supplied." Till the autumn of 1934 chlorination of the supply had been carried out but "was discontinued due to the breakage of tools." H. H. S.

YANG (Y. N.) & SUNG (C. H.). **A Report of Laboratory Examinations in a Dysentery Epidemic in Kiangsi with Special Reference to the Examination of Carriers.**—*Chinese Med. Jl.* 1936. Feb. Supp. No. 1. pp. 275–279. [Summary appears also in *Bulletin of Hygiene.*]

Since 1928 there have been almost every year outbreaks of dysentery of an epidemic character in Kiangsi Province, and particularly in the districts of Ningtu, Huichang and Hsingkuo. In the summer of 1934 cases numbered thousands and fatalities were many. In the last month of 1934 and the first of 1935 a survey was made of 23 Army hospitals, field and base. There was practically no isolation of sick and wounded soldiers, and almost complete neglect of sanitation.

During the two months 2,674 samples of faeces were examined, only one examination for each patient. The method employed was the lactose fuchsin agar and the China blue rosalinic acid plates for isolation of organisms, followed by agglutination with a Shiga and a mixed Flexner sera. Of the 2,674, 1,069 were from "dysentery patients" and of these 146 or 13·7 per cent. were positive ; 40 were excreting *Bact. dysenteriae* Shiga and 106 *Bact. dysenteriae* Flexner. Among 1,066 ill with other diseases, malaria, enteric fever, etc., 112 or 10·5 per cent. were passing the dysentery bacteria, 42 Shiga and 70 Flexner. Among 277 healthy hospital orderlies 5·4 per cent. (15) were carriers, 3 Shiga, 12 Flexner, while of 262 healthy students 21 or 8·0 per cent. were carriers, 4 of Shiga, 17 of Flexner. Of the total examined, therefore, 294 or 11·0 per cent. were positive ; 89 or 30·2 per cent. of the positive, 3·3 per cent. of the total, were passing the Shiga organism and 205 or 69·8 per cent. of the positive and 7·6 per cent. of the total, one of the Flexner group [in the text the figures are erroneously given as 7 of Shiga to 2·3 Flexner]. Clearly, the condition of the Army hospitals leaves much to be desired and the number of carriers among the apparently healthy is high. H. H. S.

NAVOKA (Josaia R.). **Dysentery Epidemic in Ra.**—*Native Med. Practitioner.* Suva. 1935. Sept. Vol. 2. No. 3. pp. 269–272.

This account of an outbreak of dysentery is of more than ordinary interest in that it is contributed by a Native Medical Practitioner qualified from the Suva Medical School. In the first four months of 1935 there were 85 cases admitted, 73 Fijians and 12 Indians, and 16 ended fatally, a case mortality rate of 18·8 per cent. Thirty-seven (14 fatal) were children under 5 years of age, 15 (none fatal) between 5 and 12 years and 33 (2 fatal) above this age. The fatality was higher among the Fijians, 15 out of 73 or 20·5 per cent., but only one among the 12 Indians. Thirty-seven specimens of stools were sent to the Suva Laboratory, and 9 were positive ; in 8 the organism was *Bact. dysenteriae* Shiga.

The steps taken to deal with the outbreak are detailed and show that everything was done that was possible to prevent further spread. The treatment in hospital is detailed. Before being allowed to return to his village, the patient is transferred to the convalescent ward and kept under observation for a week while taking full diet and having no treatment. Only if he remains well during this period is he given his discharge from the hospital.

H. H. S.

SEKI (K.). **The Clinical Observation of the Ekiri and Dysentery of Children.**—*Oriental Jl. Dis. Infants.* 1935. July. Vol. 18. No. 1. pp. 8-10. [Summary appears also in *Bulletin of Hygiene.*]

Ekiri is the name given in Japan to a disease showing certain points of resemblance to severe dysentery with toxic phenomena. "Clinically," states the author, "it is impossible to discriminate Ekiri . . . from dysentery." The author analyses 382 cases observed by him in 3 years. Children are chiefly attacked, many in the 2-5 years period; it is commonest in the summer, with a maximum prevalence in August. Fifty of the 382 died, a 13 per cent. fatality. Serious symptoms usually came on early, often in 6 hours, at most 36, and on an average 18 hours. The symptoms are feeble pulse, marked cyanosis, convulsions and coma, with diarrhoea and passage of mucus, blood and pus. Death occurred usually within 36 hours, 40 died in 17 hours. In 84 patients convulsions preceded the other symptoms. Rise of temperature occurred at the onset, but disappeared by the 5th or 6th day as a rule and might do so as early as the second day.

H. H. S.

TEN BOKKEL HUININK (A.). **Dysenterie bij kinderen.** [**Dysentery in Children.**]—*Nederl. Tijdschr. v. Geneesk.* 1934. Aug. 24. Vol. 79. No. 34. pp. 4051-4056. English summary (9 lines).

An account is given by the author of an illness of varying degree of severity occurring in four children of one family. One died within a short time of becoming ill. The second had symptoms of an acute toxic condition—sunken eyes, torpor and weakness of pulse; the third had one day's elevation of temperature but was scarcely ill, while the fourth had only a slight rise of temperature. All had too frequent stools without a true diarrhoea and the frequency had disappeared in a few days. A slight admixture of blood and mucus was only evident in two of the cases. This series is brought forward along with some other illustrative cases to show how Sonne dysentery, for that bacillus was isolated from the stools, can give rise to serious toxic symptoms or even prove fatal. This is quite a common experience in the Netherlands Indies although the affection is usually regarded as benign in Holland. "Stress is laid on the fact that in Holland in all cases of acute intoxication accompanied by fever, even when no symptoms from the intestinal tract are present, the stool should be examined" for dysentery bacilli.

W. F. Harvey.

MANSON-BAHR (Philip). **The Differential Diagnosis of Diseases of the Colon (Dysentery and Colitis).**—*Lancet.* 1936. Apr. 4 & 11. pp. 759-765; 830-834. With 12 figs. & 1 coloured plate.

The author very wisely allows himself considerable latitude in his interpretation of "differential diagnosis," and includes in his survey

much valuable information on the aetiology and pathology of the diseases which may give rise to the symptom-complex of dysentery. Thanks to the investigations and teaching of the author and other workers, much of the ground covered is already familiar to those who are concerned with tropical disease.

The author protests against the practice of diagnosing amoebic dysentery on the sole evidence of the presence of Charcot-Leyden crystals, pointing out that he has demonstrated these bodies in cases of intestinal coccidiosis, ulcerative colitis, and carcinoma of the rectum. He agrees, however, that when these crystals are present in large numbers, a prolonged search should be made for the dysentery amoeba. *Giardia lamblia* is considered to be definitely pathogenic, in certain conditions, but the author keeps an open mind as regards the pathogenicity of other intestinal flagellates which, he points out, may be an added infection on top of amoebic or bacillary dysentery. This is true, too, of giardiasis in which condition a search, sometimes of necessity lengthy and repeated, may disclose an underlying amoebic infection. Ulcerative colitis is postulated as a systemic blood dyscrasia due to some unidentified specific infective agent, the primary intestinal lesion being caused by excretion *via* the mucous membrane of toxic products. Another cause of dysenteric symptoms, less generally recognized than the foregoing, is an involvement of the rectum in lymphogranuloma inguinale which results in chronic inflammation and even stricture, a condition especially encountered in China.

These Lettsomian Lectures are comprehensive and essentially practical, and the clear picture presented will be of help in clearing up some of the existing confusion regarding the manifold causes which may produce the dysenteric syndrome. W. P. MacArthur.

HETSCH (H.) & ANTON (H.). Der heutige Stand der Lehre von der bazillären Dysenterie und ihrer Bekämpfung.—Reprinted from *Med. Welt*. 1935. No. 12. 10 pp.

TIMPANO (P.) & CASTORINA (G.). La balantidiosi nei bambini. [*Infection of Children by Balantidium*.]—*Pediatrics*. 1935. Apr. 1. Vol. 43. No. 4. pp. 449-453. With 4 figs. English summary (2 lines).

From the district of Calabria in Sicily the authors report 4 cases of balantidiosis in children 5 to 9 years of age. Symptoms attributable to the dysenteric condition were present. In all cases a cure was effected by oral administration of arsenical combined with enemata of quinine, ipecacuanha or thymol. C. M. Wenyon.

YERED (Domingos). Algumas considerações sobre um caso de balantidiose intestinal e seu tratamento. [*A Case of Balantidiosis*.]—*Brasil-Médico*. 1935. Dec. 7. Vol. 49. No. 49. pp. 1093-1094.

A man, 71 years of age, a pig-breeder had suffered with dysenteric symptoms for over 3 years. He passed 14 or more stools daily, containing blood and mucus and was becoming very weak and emaciated. Examination of the faeces revealed *Balantidium coli* in large numbers, 6-7 per field. A new remedy, Carobinase, was tried; this is a watery extract of *Jacarandá decurrens* administered, 25 gm. in 500 cc. hot

water, as a rectal lavage. It has been recommended also for *Giardia* infection, administered by duodenal tube, and by enteroclysis or vaginal douche for *Trichomonas*. After three weeks the patient's general state had greatly improved and *Balantidium* was no longer seen. Weekly examinations for five successive weeks continued to yield negative results and the author is convinced that definite cure has been accomplished.

H. H. S.

BANIK (Lal Mohan). A Case of Dysentery caused by *Balantidium coli*.—*Indian Med. Gaz.* 1935. Oct. Vol. 70. No. 10. p. 566.

JOUCK (N.). **The Pathological Anatomy of Human Balantidiosis.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 3. [In Russian pp. 239–243. With 6 figs.]

An account is given of the histopathology in three cases of human balantidiosis, all of which died shortly after admission into the hospital with symptoms of acute enterocolitis. The pathological changes observed are similar to those previously recorded. C. A. Hoare.

ATCHLEY (Floyd O.). **The Maintenance of a Strain of *Balantidium* in Laboratory Rats.**—*Jl. Parasitology.* 1935. June. Vol. 21. No. 3. pp. 183–185.

GLASER (R. W.) & CORIA (N. A.). **The Partial Purification of *Balantidium coli* from Swine.**—*Ibid.* pp. 190–193.

In the first paper the author describes his micropipette method of introducing into a Ringer-serum-rice starch medium single specimens of balantidium from the faeces of the chimpanzee. With the pure-strain culture thus obtained rats were inoculated intracaecally by laparotomy and balantidium infection established. By inoculating the caecal contents intracaecally from rat to rat every three to six days the strain has been maintained for a year.

In the second paper the authors record the culture of balantidia in semi-solid medium in V-shaped tubes. When material is inoculated at the top of one limb the balantidia pass in the course of 24 to 48 hours towards the other limb more rapidly than the contaminating bacteria, so that by repeating the process several times with material pipetted from the other limb the culture can be largely purified of bacteria with the result that in subcultures the ciliates survive longer than they did at first, subculture being only necessary every seven days.

C. M. W.

NELSON (E. Clifford). **Cultivation and Cross-Infection Experiments with Balantidia from Pig, Chimpanzee, Guinea Pig and *Macacus rhesus*.**—*Amer. Jl. Hyg.* 1935. July. Vol. 22. No. 1. pp. 26–43. With 1 fig. [16 refs.]

Balantidia obtained from the caeca of recently killed pigs and guineapigs and from the faeces of the chimpanzee *Macacus rhesus* were introduced into the stomach of 61 rats which had been prepared for infection by placing them for 5 to 10 days on a 85 per cent. carbohydrate diet. The infection in the rats was controlled by daily

examination of the soft faeces which are passed. The balantidia from the chimpanzee and pig established themselves readily in the rat, one animal retaining the chimpanzee ciliate for 129 days and another the one from the pig for 489 days. No variations in morphology or conjugation cycle resulted from the life in the rat. The attempts to infect rats with *B. simile* of *M. rhesus* and *B. caviae* of the guineapig failed, as also did those to cultivate these ciliates in media which readily gave cultures of the ciliates from chimpanzee and pig. The ciliates in cultures were found to conjugate at a time of food abundance rather than at times of hunger.

C. M. W.

GABALDON (Arnoldo). *Balantidium coli*: **Quantitative Studies in Experimental Infections and Variations in Infectiousness for Rats.**—*Jl. Parasitology*. 1935. Oct. Vol. 21. No. 5. pp. 386-392.

Strains of balantidia from chimpanzees and pigs were studied in 296 experimental rats. It was noted that the strains varied greatly as regards their power of infecting rats and in the intensity of the infections when these occurred.

C. M. W.

CORRADETTI (Augusto). *Giardia enterica* (Grassi, 1881), the **Correct Name for the Giardia of Man.**—*Jl. Parasitology*. 1935. Aug. Vol. 21. No. 4. pp. 310-311.

The author argues that as GRASSI in 1881 published a paper with the title "Di un nuovo parassita dell'uomo *Megastoma entericum*" the correct name of the parasite variously known as *Lamblia intestinalis*, *Giardia intestinalis*, *Giardia lamblia*, etc., is *Giardia enterica* (Grassi, 1881).

C. M. W.

CALDER (Royall M.) & RIGDON (R. H.). **Giardia Infestation of Gall Bladder and Intestinal Tract.**—*Amer. Jl. Med. Sci.* 1935. July. Vol. 190. No. 1. pp. 82-88. With 2 figs. [19 refs.]

The case reported is that of a man who died in hospital from persistent diarrhoea after 16 years' illness. Laboratory examination had revealed giardia in the stools and vomit. At autopsy a diffuse enterocolitis was found, with superficial ulceration in the colon. The gall bladder was normal in size and contained a brownish-black secretion. It is stated that "some of this secretion, before the gall bladder was opened, was found to be teeming with *Giardia*" which, however, were not seen in sections. The paper unfortunately does not state exactly how the secretion was obtained from the gall bladder before opening, whether by syringe or by pressure through the duct or whether all possibility of contamination with duodenal contents was avoided. The relationship of the flagellate, whose habitat is the duodenum and upper part of the small intestine, to the lesions of the colon is not clear.

C. M. W.

DIBOLD (H.). Zur Behandlung der Lambliosis intestinalis. [**Treatment of Infestation by *Lamblia intestinalis*.**]—*Med. Klin.* 1935. June 21. Vol. 31. No. 25. pp. 815-817.

The paper concludes that *Giardia intestinalis* is definitely pathogenic and that its eradication depends as much upon the administration

of drugs which may act directly on the organism as upon the treatment of the special organs—gall bladder, liver, pancreas, intestine—to which the symptoms of any particular case direct attention. C. M. W.

CAMPONOV (Luis E.). Las piretrinas como tratamiento de las parasitosis intestinales. Nota previa. [**Pyrethrines in the Treatment of Intestinal Parasitism.**—*Prensa Méd. Argentina*. 1935. Dec. 4. Vol. 22. No. 49. pp. 2371–2372.]

The uses of pyrethrum or pellitory (*Chrysanthemum cinerariaefolium*) have an interesting history. Apart from its known insecticide properties in powder or infusion, some 80 years ago it was used in powder form in the Caucasus for expulsion of *Enterobius*, and 4 years later the infusion was used *per os* and *per rectum* for *Ascaris* infestation. In 1924 the combined active principle of the flowers was isolated by STAUDINGER and RUDZICKA. This proved to be toxic to cold-blooded animals, but harmless for man and warm-blooded animals.

The author made trial of this in cases of Lambliasis, some of which had resisted all the usual modes of treatment, stovarsol, treparsol, neosalvarsan in high doses, yatren, methylene blue, naphthalene, and jacaranda. He gave a 0.5 per cent. strength in oil, in doses of 5 mgm. twice daily, by mouth and by rectum. In obstinate cases he gives 60 drops of this solution in oil [? emulsion] in 25 cc. of distilled and sterilized water [why sterile?]. Of 20 cases treated 12 were negative for periods of examination up to three months, and 8 of them were negative after 4 days' treatment. H. H. S.

HEGNER (Robert) & ESKRIDGE (Lydia). **Susceptibility and Resistance of Rats to Infections with Trichomonad Flagellates from Rat and Man.**—*Amer. Jl. Hyg.* 1935. Sept. Vol. 22. No. 2. pp. 307–321.

— & —. **Absence of Pathogenicity in Cats infected with *Trichomonas felis* from Cats and *Trichomonas hominis* from Man.**—*Ibid.* pp. 322–325.

Trichomonas from kittens infected experimentally with *T. hominis* or *T. felis* did not support, either from clinical symptoms or post mortem appearances, the view that these trichomonads can be pathogenic to kittens. It was shown that clean cats associating with infected ones might contract an infection. It was also proved that carbarsone was effective in eliminating trichomonas infection from cats.

C. M. W.

CICCHITTO (Angelo M.). Dissenterie miste da *Entamoeba coli*-*Blastocystis jalinus* e da *Blastocystis jalinus*-*Trichomonas intestinalis*.—[**The Effect of Blastocystis in Conjunction with Protozoa in Production of Dysenteric Symptoms.**—*Policlinico*. Sez. Prat. 1935. Aug. 26. Vol. 42. No. 34. pp. 1671–1679. With 2 figs. [41 refs.]]

Writing of *Blastocystis* in the human intestine the author expresses the opinion that this organism, harmless when alone, may produce a type of dysentery when associated with *Entamoeba coli* or *Trichomonas hominis*. C. M. W.

GABALDON (Arnoldo). **Carbarsone : its Action on *Trichomonas hominis* and on Rat Trichomonads in Vitro.**—*Amer. Jl. Hyg.* 1935. Sept. Vol. 22. No. 2. pp. 326–338. With 2 charts.

Carbarsone diluted in culture fluid at a concentration of 0·3 per cent. was lethal to both *Trichomonas hominis* and a rat trichomonad in less than 72 hours. In weak solutions (0·05 per cent.) the drug retarded the development of the flagellates in culture. C. M. W.

MARMO (Achille) Contributo allo studio della metadissenteria.—*Ann. di Med. Nav. e Colon.* 1935. Sept.–Oct. 41st Year. Vol. 2. No. 3–4. pp. 611–651. With 4 figs. [100 refs.]

MISCELLANEOUS.

CLEMENTS (F. W.). **A Medical Survey in Papua : Report of the First Expedition by the School of Public Health and Tropical Medicine to Papua, 1935.**—*Med. Jl. Australia*. 1936. Apr. 4. 23rd Year. Vol. 1. No. 14. pp. 451-463. With 10 figs. & 2 maps. [12 refs.]

In 1912-13 BREINL made a survey of the coastal belt of Papua and described the forms of disease he found [see this *Bulletin*, 1914, Vol. 4, p. 407]. The work undertaken by the present expedition was a village to village survey of an area in the western portion of the Central Division of Papua, the object being "to obtain factors of health and disease amongst a virile vigorous people living in a well-populated area." In two months 400 miles were covered and over 5,000 natives examined. These belonged to three groups, the Roro, a coastal tribe, the Mekeo, a subcoastal, and mountain groups living at 5,000-7,000 feet. The results are set out in tables giving in detail and in summary the vital statistics and disease incidence in each of the three groups. It is seen at once that yaws and two forms of *tinea* preponderate in the Mekeo and Roro tribes. *Yaws*, the author believes, was introduced from Polynesia in the first half of last century. It has made little progress inland possibly owing to altitude but more probably to the absence of intimate contact with the disease, for when coastal natives were entertained for the first time at a mountain dance several of the mountaineers contracted a severe form of yaws. A table gives the age distribution of 397 cases and demonstrates the usual preponderance of secondary cases in children. The tertiary manifestations included periostitis of the tibia, extensive cutaneous ulceration and scarring, periarticular nodules and plantar yaws.

True *tropical ulcer* was seen in less than 1 per cent. and mostly in young children, none in the mountain districts. *Tinea imbricata* was widely spread in the coastal tribes in both young and old, but some natives seem to have an absolute immunity. *Tinea flava* was not seen in children under 12 years of age.

In the Mekeo the maximum amount of *malaria* occurs in children from 2-5 years; all children have enlarged spleens; it is a hyper-endemic malarious area (CHRISTOPHERS). The parasite is *P. falciparum* and the vector *A. punctulatus*, var. *mollucensis*. The salting process, it is stated, kills few babies and the Mekeo population is increasing. Two cases of *filariasis* were seen in one village where a night survey showed embryos in the blood of all natives over 45. A *hookworm* survey of one of the Mekeo villages failed to find ova in the stools of the children. The village pigs promptly remove human excreta and it is suggested that this and a good diet keep hookworm disease sub-clinical. Details are given of seven cases of *leprosy*, believed to be a disease of recent introduction. All were chronic and there were no skin lesions; it is doubtful whether they were infectious. Of general diseases those seen and discussed are: goitre, infantile paralysis, dermatitis *ab igne*, paralysis agitans, rheumatic carditis, and myasthenia gravis.

Goitre was found in four mountain villages and its aetiology is discussed. The native belief that it occurs in women who eat pig during gestation recalls the statement of McCARRISON that excessive diets of protein and fat can produce goitre; feasts of pig in this region may last a month.

The *dermatitis ab igne* is produced by the crouching of the naked natives over a fire, especially in the long cold evenings of the wet season. The anterior surface of the legs is affected.

Chest lesions were noted in 42 natives, all over 30 years. Sputa were examined but T.B. not found and it is believed that these were cases of *chronic bronchitis*. *Tuberculosis* is, however, mentioned elsewhere in the paper.

Tables give death and birth rates in the several villages of the Mekeo and Roro for a quinquennium and the vital statistics of nine British Colonies are given for comparison. [When such figures are given for Nigeria, Nyasaland, British Guiana, etc., it would be well to state that they cover only a small part of the area in question.] In both tribes there is an annual increase, 2.1 and 8.9 per mille respectively. An endeavour to ascertain the causes of death led to the conclusion that common causes are complications of pregnancy and snake bite. Of native customs of medical interest one may cite the following: after the marriage ceremony the bride is excused all manual labour and is fed on nourishing foods till after the birth of the first baby. This had its origin in the hope thereby to prevent miscarriage. Whether the intended effect followed is not stated.

A. G. Bagshawe.

HOOPER (Robert C. D.) & LOEWENTHAL (L. J. A.). **A Survey of Health Work in Teso, Uganda.**—*Ann. Trop. Med. & Parasit.* 1936. Apr. 8. Vol. 30. No. 1. pp. 17–32. With 1 map & 4 figs. on 1 plate.

This paper is an interesting account of the attempts of an embryonic health service to ameliorate the health conditions of a primitive population with, from the European standpoint, very inadequate resources.

The word "survey" used in the title of the paper has a rather specialized meaning in health literature. This is not a health survey of that kind. No mention is made of birth rates, death rates or morbidity statistics. The difficulties attendant upon public health work among backward communities are, however, graphically described. These are familiar enough to workers in the tropics but are likely to surprise those whose experience has been confined to countries with an older western civilization.

The District of Teso is the northern part of the Eastern Province of Uganda. It has an area of 4,052 square miles, a native population of 300,000, and a European medical and sanitary staff of three—a District Medical Officer, a Nursing Sister and a Sanitary Inspector. A considerable amount of the time of the two former is obviously devoted to curative medicine. Apart from Soroti, the administrative headquarters, there are eleven townships. These consist of single rows of trading premises and dwellings, on either side of a road, and scattered native dwellings usually within a radius of a mile, or a mile and a half, from the market. The standard of living even here is very low. A village may comprise dwellings scattered over an area of five square miles. Adequate inspection of such a village may entail three or four days' walking. Communications are good; most native dwellings are within seven miles of a road or track passable to motor cars. Sanitary control of the movements of the native population is, however, impossible; the African often travels by bush paths or by canoe on lakes.

In the native dwellings the most elementary rules of hygiene are conspicuously ignored. Windows or open ventilation of any kind are

often "tabu," as possible means of access for the evil eye, mosquitoes or other unwelcome visitor.

Plague, dysentery, smallpox and cerebrospinal fever are prevalent from time to time. Yaws, helminthiasis and deficiency diseases constantly affect a proportion of the population. Every adult native has developed a tolerance to the malaria parasite. Trachoma, venereal disease and tropical ulcer are very prevalent.

There are four African sanitary orderlies in charge of the health work of rural areas. Each is posted to the headquarters of a "county" where he lives in a model compound. The average monthly cycle running of these men is 800 miles.

The above excerpts from an interesting paper are sufficient to illustrate the magnitude of the problems facing a small enthusiastic band of health workers.

Norman White.

MAURITIUS. Annual Report of the Bacteriological Laboratory for the Year 1935 [ADAMS (A. R. D.), Senior Pathologist & Superintendent]. —22 pp. 1935. Dec. 2.

The Annual Report of the Government Pathologist, Mauritius, again contains much of interest. The use of McCartney's procedure and of "canned media" had considerably facilitated the routine work. The actual number of specimens dealt with in routine was a little less than in the preceding year. These are divided into pathological, including microscopical examinations of blood, faeces, urines, sputa, throat and nose swabs, and tissues, and serological work; bacteriological examination of the same materials and of water supplies; medico-legal; research and miscellaneous. The results of the water analyses are satisfactory in the colder months, less so in the warmer on account of algal growth. Dr. Adams is of opinion that some physico-chemical precipitation treatment prior to filtration would be better than chlorination.

Trypanosoma boylei appears to be common in the *Triatoma rubrofasciata*, the reduviid bug of Mauritius. Dr. MADGE is collecting material from cases of human myiasis; further instances of infestation by *Bertiella studeri* have been observed, 5 having now been recorded in Mauritius.

Two special problems of research have been pursued; the first was the investigation of the molluscan host of the *Schistosoma haematobium* endemic in the island, viz., *Bulinus (Pyrgophysa) forskali*. This is widely distributed in running water throughout the Colony and has been found on watercress and other edible plants in the market stalls and is, consequently, of much public health importance. Its small size results in its producing only a few cercariae each, but this is compensated by their large aggregations. Previous lack of success in experimental work is ascribed to under-infestation. A survey of the waterways of the island is to be undertaken to determine the distribution of these snails and also a survey of the prevalence of the disease they convey. A second important research problem taken in hand was trypanosomiasis of stock, three species, *T. evansi*, *T. vivax* and *T. theileri*, being found in indigenous cattle. This is dealt with elsewhere in this *Bulletin* [see p. 650].

Four papers have been published by Dr. Adams during the year, namely :—

1. Studies on Bilharzia in Mauritius. II. The Recovery of Adult *Schistosoma haematobium* after Development in *Bulinus (Pyrgo-physa) forskali*. *Ann. Trop. Med. & Parasit.* 1935, Vol. 29, p. 255.
2. Trypanosomiasis of Stock in Mauritius. 1. *Trypanosoma vivax*, a Parasite of Local Stock. *Ibid.* p. 1.
3. Ascariasis of the Liver. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1935, Vol. 28, p. 419.
4. A Fourth Case of Human Infestation with *Bertiella studeri* (Cestoda) in Mauritius. *Ibid.* Vol. 29, p. 361. H. H. S.

VISCHER (Mattheus). Medizinische Erfahrungen unter den Dajaken in Süd-Borneo. [**Medical Practice among the Dayaks of South Borneo.**].—*Schweiz. Med. Woch.* 1936. Mar. 28. Vol. 66. No. 13. pp. 315-320. With 12 figs. [12 refs.]

This is an account by a Swiss missionary of the conditions of life, vital statistics and diseases seen in six years at a mission hospital in S. Borneo. It differs little from similar accounts of primitive natives in other parts of the tropics but comes from a little known region.

These Dayaks inhabit a lowland district "five motor-boat hours" from the capital, Banjermassin, situated on the south coast of the island. The author saw 17,258 patients, representing he thinks 8,000 Dayaks. The population is scattered.

Of tropical disease *malaria* is general, chiefly tertian but also sub-tertian. Severe forms are rare and blackwater has not been seen. In 1933 malaria formed 26 per cent. of diagnoses. Quinine, plasmoquine and atebrin are all used in treatment. Atebrin as a patent medicine is obtainable by anyone. The author says it has overcome the mistrust of the natives and now threatens the flourishing quinine industry of the Netherlands Indies. Refractory cases, however, are still met with. *Amoebiasis* is said to cause 10 per cent. of admissions. It is treated by emetine and to a greater extent by yatren which is readily obtained by the natives. Spirocid is also useful but the author has seen toxic symptoms follow a moderate dose. Liver abscess is not uncommon; emetine injections are curative and operation is never needed; other forms of dysentery are not mentioned. *Yaws* is widely spread. Practically every Dayak suffers or has suffered. Neosalvarsan is the best drug, 0.3 gm. for a grown man; larger doses may be followed by unpleasant symptoms. Bismuth injections are less effective. Spirocid is useful. The author finds that spirocid and salvarsan are less dangerous in yaws than in syphilis. Syphilis is rare in this region and he sees no objection to spirocid treatment of yaws by school teachers. Owing to the high price and the indolence of the natives there is little risk of overdose. Salvarsan-resistant cases are treated by "Terpin Stahl A," a Swiss preparation recommended by Albert SCHWEITZER. It is estimated that one per mille of the population suffers from *leprosy*. Lepers are segregated by the natives when the disease is far advanced. It is children who contract leprosy, adults very rarely. Of leper colonies he aptly writes—As philanthropic establishments they are indispensable, as research institutions they are important, for the combatting of endemic leprosy they are useless (untauglich). Of other diseases *tuberculosis*, chiefly pulmonary, is wide-spread. *Xerophthalmia* forms 0.5 to 1 per cent. of diagnoses and is found in children between 4 and 15 years, as a rule convalescents from dysentery and

gastro-enteritis. Cod liver oil is rapidly curative. Typical signs of *ricketts* were seen in 1 to 1.5 per cent. of treated children; sick children are confined by the natives to their dark houses and fed on rice. *Tinea imbricans* is widely spread and refractory to treatment. Syphilis is very rare and gonorrhoea very mild. A table follows of the frequency with which a number of diseases were seen. The illustrations depict chiefly yaws.

A. G. Bagshawe.

BRUNELLI (Piero). Cenni nosografici sulla regione di Gedda. [**Disease in Jedda and its Environs.**—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1936. Jan. Vol. 17. No. 1. pp. 34–48. With 8 figs.

Included in the sanitary and medical organization of Jedda is an English doctor, a Dutch surgery in charge of a Javanese medical man, a Russian Legation Dispensary, and an Italian dispensary, while the local Government entrusts the sanitary measures to the hands of Syrian doctors and pharmacists, and the laboratory is directed by a Turkish doctor. Unfortunately, this article gives no figures, resting content with general vague terms. At the time of the Mecca pilgrimage "tens of thousands" of persons of all ages and either sex are gathered there, young children, old people, many suffering from serious disease, women in advanced pregnancy. Reference is made to the climate, water supply (or lack of it), and prevalence of mosquitoes. The splenic index in the town is very high; it is given as 86 per cent. of the children; of 70 blood specimens positive for malaria 44 showed *P. vivax*, 16 *P. falciparum*, 9 both these, and one *P. malariae* (there was a little uncertainty about this). *Phlebotomus papatasi* abounds, also in the heat of summer *Aedes aegypti*, and many cases of dengue occur. Dracunculosis is seen among the Beduins, and a few cases of filariasis, but only in those from the interior. Syphilis is not very common; more frequent are cases of soft chancre and gonorrhoea, and more rarely granuloma venereum [no mention is made of Lymphogranuloma inguinale]. Amoebic dysentery is common and, in children, diarrhoea associated with Giardia. Of helminthic infestations, ascariasis heads the list, ankylostomiasis coming next; one case of *T. saginata* is noted. Trachoma affects "hundreds of victims" every year. Asthma is widespread [nothing is said of the prevalence of tuberculosis].

H. H. S.

WATSON (Alexander J.). **Vincent's Disease.**—*Chinese Med. Jl.* 1936. Jan. Vol. 50. No. 1. pp. 46–49. With 2 charts.

During the four months November 1935–February 1936 the author saw 20 cases of Vincent's angina, occurring in a local outbreak at Yun-nanfu, and other milder cases probably escaped observation. The symptoms were, except for difference of degree, very similar in all—thick exudate on the tongue ("half the thickness of the tongue"), difficulty in moving the tongue, some salivation and dysphagia and a deep sore throat, about the level of the hyoid. *B. fusiformis* and spirilla were present, sometimes one predominating, sometimes the other, and there was usually a stomatitis with ulceration of palate, tongue or lips. The false membrane which some writers have reported in cases of Vincent's disease was not seen in those of the author. The temperature was not very high, up to 102°F. or a little higher (102.4°F.).

In some, 2-3 weeks elapsed before free movement of the tongue was regained, the inflammation at the base being severe. *C. diphtheriae* though looked for was not found. H. H. S.

SNIJERS (E. P.). Over het onderzoek van het scleroma respiratorium (rhinosclerom) in Ned-Indië. [**Investigations into Rhinoscleroma in Netherlands India.**—Reprinted from *Feestbundel 1936 v. h. Geneesk. Tijdschr. v. Nederl.-Indië*. pp. 397-410.]

This is a review of our knowledge of rhinoscleroma and a recapitulation of the steps by which it was established as a definite disease in the Netherlands Indies. A description of the condition is given as: An inflammatory process into which there enter degenerative, exudative and proliferative phenomena. The infiltration is mainly of plasma cells, often degenerated and hyaline, with a variable accompaniment of lymphocytes and polymorphonuclears. It is a chronic condition with very special localization and morphological character. Foamy macrophage cells, sometimes filled with capsule bacteria, may also be a microscopic feature.

Other characters of the disease are that it has been found especially in the Batak lands of Sumatra, that it is endemic, chronically but comparatively slightly infective, and of familial incidence. It is in some respects reminiscent of leprosy and is essentially a disease of "the great unwashed." Evidence of a circumstantial character has been produced that it is a disease of ancient times, still clinging to the Moham-medan element of the ancient Batak people but obviously a disease which is dying out with the advent of hygiene. In nearer British India the disease has been signalled in Chota Nagpur and an endeavour is made to link up the people of this plateau, of the Munda and Kolar stem, with the people of the Batak lands. Research in the Chota Nagpur region might offer some further proof of this connexion.

A typical scleroma is not known in animals nor has the condition been transmitted experimentally to animals, but the author considers that there is a possibility of the pig being a carrier. Pure cultures of what is presumably the causal organism, *Klebsiella rhinoscleromatis*, are obtainable from the deeper tissues of the lesions produced and there is every reason, from cultural and serological tests, with antigen analysis, to regard this organism as specific. It is to be distinguished from *Kl. ozaenae* and *Kl. pneumoniae*. Although these organisms may be mixed with it in nasal mucus, they are not to be found in the deeper parts of affected tissue which, nevertheless, yield pure cultures of *Kl. rhinoscleromatis*. W. F. Harvey.

KARUNARATNE (W. A. E.). **The Pathology of Rhinosporidiosis.**—*Jl. Path. & Bact.* 1936. Jan. Vol. 42. No. 1. pp. 193-202. With 26 figs. (4 coloured) on 7 plates. [37 refs.]

"Summary of the fifty-three reported cases.

"*Geographical distribution.* This is remarkable for its occurrence over a wide area and the cases have also been very isolated. Most of the patients have been Indians (40), with a few in Ceylon (4), North America (5), South America (3) and Italy (1). The very wide distribution of the disease is noteworthy. In the solitary European case (Orlandi), a woman, aged 56, developed a rhinosporidial growth in the conjunctiva following injury of the eye by a splinter. Seeber's original

case was also a native of Italy, but he had been resident in South America since his infancy. The case described by Ashworth was that of an Indian student who had come to Edinburgh for purposes of study, and the two other cases referred to in his monograph were also Indians. Of the four cases reported from Ceylon, three had not been out of the island. With my 34 cases, the total number from Ceylon is only a little short of the total of Indian cases. All 5 cases reported from North America occurred in widely separated areas. Only one had been outside the United States and that was for a three days' visit to Canada. The case described by Wright (1907) had lived all his life in the neighbourhood of Memphis (Tennessee), whilst Graham's case, a 12 year old negro boy born in Georgia had resided in a small coal-mining village in Alabama since he was four.

"Age. The ages, recorded in 33 cases only, ranged from 8 to 60 years. The disease mainly affects young subjects, 24 of the 33 being below the age of 30 and 12 below the age of 20.

"Sex. Only 4 of the 53 cases were females.

"Anatomical Distribution. In 40 of the 53 cases the lesion was in the nose, mainly the anterior part. The conjunctiva was affected in 8, the lachrymal sac in 2 cases, and the disease occurred once each in the penis, uvula and external auditory meatus. One patient, a woman, had both a nasal growth and an independent growth on the posterior pillar of the fauces. In my own series of 34 cases, two were conjunctival, one lachrymal and the rest nasal."

POLIDORI (Tommaso). I micetomi in Somalia. [**Mycetoma in Italian Somaliland.**—*Arch. Ital. Sci. Med. Colon e Parassit.* 1936. Jan. Vol. 17. No. 1. pp. 19-33. With 7 figs.

The author has collected and reports in tabular form cases of Madura foot and other mycotic affections seen by him at the Civil Hospital at Mogadiscio [Mogdishu, on the Benadir coast]. Five of the former and 57 of other forms are mentioned. Many, in fact the majority, are not seen until the later stages, the patients regarding the condition as syphilitic or as resulting from some insect bite until the tumour is of a size to impede walking, or the ulceration, abundance of secretion and foul odour force them to seek assistance. Large doses of potassium iodide rarely give satisfactory results, and in many cases amputation is necessary, though, if the patient is seen early enough, enucleation may succeed. The author has never observed metastases, but if enucleation is not thorough recurrence takes place. All the patients were in a state of failing health, with anaemia, and many of them showed signs of food and vitamin deficiency.

H. H. S.

PARISE (Nicola). Osservazioni cliniche e ricerche sperimentali sulla nocardiassi.—*Giorn. Ital. di Malat. Esot. e Trop.* 1935. Aug. 31, Sept. 30 & Oct. 30. Vol. 8. Nos. 8, 9 & 10. pp. 195-8, 201-4, 207-8; 234-6, 239; 248, 251-5, 257-8. With 15 figs.

CHOPRA (R. N.) & CHAUDHURI (R. N.). **The So-called Mystery Disease of Calcutta (*Jhin-Jhinia* or *Tharitaria*).**—*Indian Med. Gaz.* 1936. Apr. Vol. 71. No. 4. pp. 205-209.

This so-called "mystery disease" seems to have started suddenly last September in villages at Bolbule and Katakhal on the Ichamati river and after visiting a village for about a week passed on to the next. As many as 40-50 persons might be attacked in a night. Most were

between 18 and 35 years, Mohammedan females almost entirely at first, latterly both males and females and Hindus also, and most attacks started in the late afternoon. The following is the recorded train of symptoms :—

"The 'disease' is said usually to start suddenly with a tingling sensation in one or both feet, especially the big toes. The sensation then spreads up along the body to the head. Many patients are said to complain also of headache, giddiness and a hot burning sensation in the head. Simultaneously with or soon after this subjective sensation, the victim begins to shiver and may have severe movements of the whole body. The eyes are said to be intensely congested and the body stiff during an attack. Symptoms vary in severity ; they may be mild or severe ; consciousness is as a rule retained. The attack lasts from a few minutes to a few hours."

The name *jhunjhinia* implies tingling sensations, and *thartharia* shivering. Brief details, but all the essentials, are given of 17 cases. The local lay treatment consisted in tying the patient to a tree to keep him erect, as lying down might lead to a fatal rush of blood to the brain ; then cold water, bucketful after bucketful to the number of a 100 or more, is poured over the head to drive the blood back to the legs until the patient asks for a cessation of treatment. The only conditions revealed by physical examination have been an increase in the knee-jerks and in the pressure of the cerebrospinal fluid in some cases. The latter may be accounted for by the effect of the chilling resulting from the water treatment.

The condition is probably a neurosis of the auto- or hetero-suggested category [comparable with latah, tarantism] for considerable notoriety had been given to it in the press, all the patients had discussed it with their neighbours prior to being attacked and a sort of panic concerning it had been set up.

H. H. S.

SOEGIRI. Een geval van mimi-vergiftiging. [**A Case of King Crab Poisoning.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1936. Apr. 7. Vol. 76. No. 14. pp. 880-883. With 4 figs. on 2 plates. [Summary appears also in *Bulletin of Hygiene*.]

A description is given of presumed mimi or king crab poisoning with fatal result. The patient, a fisherman of powerful build, partook of a meal of this crab in spite of the warnings of his companions. That this was dangerous seems to have been known, but it was also suggested that the danger could be eliminated by a certain mode of cooking. No symptoms followed immediately on the meal, but the man on return with his fellows to their fishing vessel had fallen down suddenly and lost consciousness. The jaws were rigidly fixed open and there was foam upon the lips. No twitching and no vomiting occurred. Death took place about 6 hours after the meal. An autopsy was carried out, which showed no obvious cause of death and in the stomach contents were the remains of a meal of king crab. There is no reason to suppose that death was due to any other cause than that assigned.

W. F. Harvey.

FLECKER (H.). **Cone Shell Mollusc Poisoning, with Report of a Fatal Case.**—*Med. Jl. Australia*. 1936. Apr. 4. 23rd Year. Vol. 1. No. 14. pp. 464-466. With 2 figs.

Fatal results from *Conus* poisoning are rare. The author gives summaries of the symptoms in 5 non-fatal cases referred to by Professor

CLELAND in the *Australasian Medical Gazette*, 1912. Three years later a fatal case was recorded. The present instance was reported in response to a questionnaire sent to all practitioners in North Queensland asking for information on injuries caused by plants or animals in tropical Queensland.

A man of 27 years picked up a live cone shell (*Conus geographus*) on Haymen Island. He was stung in the palm, a small puncture mark being seen. Local numbness started, without any pain; ten minutes later he felt a stiffness of the lips, ten minutes later still the sight was blurred and there was diplopia; paralysis of the legs set in half an hour later after the stinging and in one hour he lost consciousness and died five hours from the time of the injury. Post-mortem revealed nothing abnormal; the organs all appeared to be healthy. The species in the five cases recorded earlier were *C. aulicus*, *C. tulipa*, both producing mild symptoms, *C. textile* mild, *C. geographus* (2), one certainly severe, and the previous fatal case was due to *C. textile*. In all of these the pain was severe and in one case the patient "writhed in agony." Medical men generally are unaware of the poisonous effects of these animals and the danger of picking up living cone shells, but the natives are fully acquainted with it and treat it with dread and respect.

H. H. S.

BODEAU. À propos de quelques accidents dus au mancenillier. [**Accidents due to *Hippomane mancinella*.**—*Arch. Méd. et Pharm. Nav.* 1936. Jan.-Feb.-Mar. Vol. 126. No. 1. pp. 122-133.]

Hippomane mancinella, the Manchineel Tree, is one of the Euphorbiaceae. It is common in the Antilles and on the shores of the Gulf of Mexico. The fruit resembles a small reddish apple; it has an acrid and rather disagreeable taste, but some persons, sailors in particular, have been known to eat several. Its effect is to produce severe burning pain in the mouth and stomach, followed by nausea and vomiting, and later difficulty in swallowing. The lips and buccal mucosa become swollen and blistered, and eroded aphthous patches appear. There are signs and symptoms of collapse, and death has been recorded.

Apart from the fruit a latex oozes from bruised leaves or broken branches and has an irritant and vesicant action. The effect is often seen on the skin of those who take shelter under these trees from a storm. Small vesicles from the size of a pin's head to a nut, by confluence, are caused. Treatment is purely symptomatic.

The latex has been used as a rubefacient and counter irritant and also as an anthelmintic [but no details as to results are known to the reviewer].

H. H. S.

RAYMOND (W. D.). **The Poisonous Effects of Some Local Species of *Euphorbia*.**—*East African Med. Jl.* 1936. Mar. Vol. 12. No. 12. pp. 369-374.

Nine species of Euphorbiaceae are mentioned by the author. The poisonous properties are not equally potent in all. The latex acts as a local irritant when applied externally and, as would be expected, acts similarly but more severely on the mucous membranes. Thus, if introduced into the eye, it sets up conjunctivitis and even keratitis, ending in blindness; in the nose, sneezing, inflammation and epistaxis; in the alimentary tract, vomiting, diarrhoea, colic, followed by collapse,

convulsions and death. Its action in man differs from that in animals in degree and perhaps in kind. Many plant-eating animals can eat it without harm, and the toxic dose, of *E. resinifera* for example, is for dogs about 30 times as great as that for man. At autopsy, if death has occurred from ingestion of the poison, there are signs of acute gastro-enteritis, ulceration and perhaps perforation.

The juice of some varieties is used as an emetic in cases of snakebite, others as an anthelmintic and for gonorrhoea; the roots and leaves of others as purgatives. [Several members of the Euphorbiaceae are employed for manufacturing arrow poisons, and these act both locally as an irritant and also as cardiac poisons. The Manchineel Tree (*Hippomane mancinella*) a native of the West Indies and Tropical America belongs to the same order. It has a fruit resembling an apple and causes severe burning pain and tenderness in the mouth and stomach, nausea and vomiting, followed by swelling and blistering of the lips and tongue and later by aphthous erosions. See preceding abstract.

H. H. S.

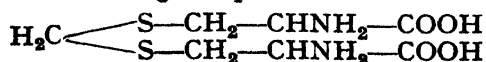
TONKING (H. D.). **Pyrethrum Dermatitis in Kenya.** With Note by J. H. SEQUEIRA.—*East African Med. Jl.* 1936. Apr. Vol. 13. No. 1. pp. 7-14. [11 refs.]

Pyrethrum, *Chrysanthemum cinerariaefolium*, of value as an insecticide, grows well in Kenya, particularly at a height of 5,000-7,000 feet, and flowers throughout the year; in fact its cultivation is a growing industry. Probably some 200 Europeans in the Colony are now cultivating it for commercial purposes. The pyrethrum content is 1-2 per cent., as in other countries, e.g., Dalmatia and Japan, but these last have but a short season of growth. Sweating facilitates solution of the irritant constituents and so enhances their action. The effects produced are: Itching at the corners of the eyes, lachrymation, irritation of the nasal mucosa with rhinorrhoea, itching on exposed parts of the body, a papular and vesicular rash, flaking or peeling of the skin and painful fissures. Exposure to sunlight exacerbates the lesions. Some persons show merely a local dermatitis from contact, others systemic allergy. Both Europeans and natives are affected, but as a rule the former more severely. Brief details of six cases are given. Removal from contact and the application of some simple protective ointment suffice for the local treatment, allergic patients must forgo contact with the plant, which probably entails leaving the district, or desensitization methods may be tried.

H. H. S.

HIJMAN (A. J.) & VAN VEEN (A. G.). Over het djengkolzuur, een nieuw zwavelhoudend amino-**zuur**. [**Djenkol Acid, a New Sulphur-containing Aminoacid.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1936. Apr. 7. Vol. 76. No. 14. pp. 840-859. With 4 charts. English summary. [14 refs.]

Djenkol acid is believed to be responsible for the toxic symptoms occurring after ingestion of the djenkol bean, *Pithecolobium lobatum*. These symptoms are chiefly urinary—pain in the kidney area, dysuria, often anuria; the urine contains blood and casts and sharp acicular crystals with the following composition



Their presence in large numbers in the urethra may cause necrosis, fistula and extravasation. The djenkol bean has a high vitamin B₁ content and, in spite of its toxic properties, is used considerably as a food. Experiments on rabbits showed that it was oxidized in the body to about the same degree as cystin, but after a few weeks the percentage of amino-acids excreted (in the form of sulphates) decreased, possibly in part from metabolic disturbance, partly from injury to the kidneys. Tests were made with rats to determine whether djenkol acid could replace cystin in the food, but the results were not conclusive. The eating of the beans by normal persons was followed by distinct increase in sulphur excreted, but the extent of this varies greatly. One man after eating two beans only suffered from anuria for two days ; although he had taken only about 150 mgm. more sulphur he excreted 1,980 mgm. of oxidized sulphur and 2,980 mgm. total sulphur. Clearly, other sources of sulphur must have been mobilized. H. H. S.

GREVENSTUK (A.). Over Renghas- en Japanlak-vergiftiging.—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1935. Nov. 26. Vol. 75. No. 24. pp. 2065–2076. [19 refs.]

REVIEWS AND NOTICES.

WU LIEN-TEH [M.A., M.D., etc.], CHUN (J. W. H.) [M.B., B.C.], POLLITZER (R.) [M.D.] & WU (C. Y.) [M.B., B.S.]. **Plague: a Manual for Medical and Public Health Workers.**—pp. xxxiii+547. With 103 illustrations (6 coloured). 1936. Shanghai: Weishengshu National Quarantine Service, 2 Peking Road. [C.S. \$10.00; 15s.]

A whole manual on one disease, of 547 pages with 103 illustrations, must betoken especial importance of the disease itself and a pressing need for instruction. This work is obviously intended for the English reader. The importance of plague as a devastating disease, which may attack any country, is worldwide, while the need for instruction is that of "medical and public health workers." It is stated in the preface that "the main aim of the authors has been to provide a practical guide to the prevention and treatment of plague." A perusal of the work shows that this aim has been fulfilled. The requirements of China and its special problems naturally occupy a prominent place in the manual and many of the illustrations have the same local significance, but any worker in any country will find some of the information he requires in this manual and will doubtless avail himself of it. There are 12 chapters in all, covering the subjects of the historical aspects of plague, its bacteriology, immunology, pathology, laboratory diagnosis, hosts and carriers, insect vectors, clinical features, therapy and personal prophylaxis, epidemiological factors, general prophylaxis and management of epidemics, and the problem of ship-borne plague. For each of these chapters one or the other of the authors is responsible. Even the medico-legal aspect of plague, as illustrated by the crime designated the "Plague Bacilli Case" is given, in an appendix, the notice due to a remarkable important event. It is certain that the sad tale of laboratory infections, as recorded here, would have to be extended if it were intended to be complete. Such cases are not always, or even commonly, published. Certain examples are, however, given in fair detail and serve the purpose of illustrating an ever-present danger for plague workers. A reference might perhaps have been made to the remarkable immunity of the staff of the laboratories engaged in plague routine or investigation, due, as one would infer, to their being regularly vaccinated. The sensitive guineapig test has shown, moreover, in some instances that the laboratories did not lack the presence of infected fleas. This seems to be a strong argument for the efficacy of the usual method of vaccination.

In view of the importance which is now attached to selvatic or wild rodent plague it is interesting to turn to the observations on this subject which are scattered through the chapter "Hosts and Carriers." The chapter makes reference at the outset to the "slogan," "No rats, no plague." It is therefore reassuring to find that the author of this chapter, Dr. Wu Lien Teh himself, maintains "that generally speaking the danger of a spread of plague from wild to domestic rodents is more apparent than real."

As Manchuria is classed, with other localities, as one of the principal foci of pneumonic plague, it was only to be expected that that form of disease would receive special treatment in this manual. In finding an answer to the question *how* pneumonic epidemics arise, the authors examine into the possibility of human pneumonic plague arising *de novo*

from rodents, but reject the idea in order to reassert their well-known and well-reasoned opinion that pneumonic plague in its principal foci, "like Egypt, Madagascar, South East Russia, Transbaikalia and Manchuria . . . usually originated in human cases with secondary lung involvement." On the further question of *why* pneumonic epidemics arise, it is excusable to find a greater dubiety, inasmuch as controversy is still as acute as ever on the reason for development of the epidemic or pandemic characters of any disease.

The illustrations throughout the work are clearly reproduced and the cost of it is very moderate. It should undoubtedly become a source of reference to many others than those for whose use it has been primarily designed.

W. F. Harvey.

HUARD (P.) & MEYER-MAY (J.). **Les abcès du foie.** Préface du Professeur A. GOSSET. [Liver Abscesses.]—pp. viii+390. With 98 figs. 1936. Paris: Masson et Cie., 120 Boulevard Saint-Germain. [65 francs.]

This is a very detailed account of liver abscess based on 150 cases seen or collected by the authors in Tonking, where they are of the opinion the disease is rarely caused by amoebae. The account therefore promised to be of great interest and importance in differentiating the large proportion of their cases that they regarded as being of unknown aetiology, for the pus of 60 out of 93 cases examined at the time (they were treated by the open operation) was free from both amoebae and bacteria, in 7 it contained amoebae and in 27 several varieties of cocci and four species of bacteria were found, not more than 4 being due to any one organism.

After summarizing in tables their own data and those of other workers, including experience in India, they describe the anatomy and blood vessels of the organ and the aetiology just mentioned. A detailed account of the pathological anatomy and complications, illustrated with diagrams of the spread of the infection to neighbouring organs and cavities, unexpectedly reveals precisely the picture of amoebic liver abscess of other warm countries, and the clinical picture also shows nothing indicative of a new and previously undescribed form of abscess in the liver. The differential diagnosis is well described, with illustrative cases somewhat condensed from the fuller accounts of all of them at the end of the volume. A noteworthy feature of this section is exploratory puncture, on the lines of spleen puncture, to allow of microscopical examinations of the material thus obtained; by this means cancer, tuberculosis and other conditions were recognized in some suspected liver abscess cases. Still more interesting is the section on X-ray examinations, for this includes the previous injection of lipiodol to allow the shape of an abscess cavity, and its communication with secondary abscesses or a bronchus, to be defined.

Turning to the section on treatment we find more of interest. First they glance at that in use in other countries, and come to the remarkable conclusion that the difference in the methods used in some can only be explained by a difference in the class of abscesses met with. In discussing medical treatment they agree with others that arsenical, yatren, and bismuth preparations, etc., are all useless in congestive hepatitis, and only emetine is effective; but they differ in holding that the latter drug is equally curative of both amoebic and non-amoebic hepatitis. The now generally used aspiration and emetine treatment of liver

abscesses is rejected by the authors, although they hold that the previous use of emetine reduces considerably the incidence of abscesses, and they advocate courses of ten days at a time in the treatment of both acute and chronic hepatitis. A full description of the open operations which they always adopt is then given, including eleven incisions with extensions of some, aided by radiology, to enable the abscess to be reached by the most direct route. Their case mortality was 24 per cent. against 3.3 per cent. in K. K. Chatterji's 186 cases and nil in Ludlow's 47 cases (later 1 in 50 or 2 per cent.) by the aspiration method, which they quote. They also admit that in 74.3 per cent. of their 35 fatal cases the pus was sterile, and attribute the high mortality to "cachexia" and complications; but these are equally present in Calcutta cases. They deal with the rare secondary haemorrhages, and only mention secondary sepsis, which does not appear to have been by any means excluded as an important cause of death; as it used to be after the open operation in India.

We may now return to the main thesis of the authors, namely, that two-thirds (they say three-fourths in one place) of their liver abscess cases are of unknown aetiology and sterile in spite of their differing in no way from cases seen in other warm climates. Their assertion that only seven per cent. of their total cases were of amoebic origin appears to be based solely on the fact that that organism was only found in the pus of 7 out of 93 cases examined at the time of opening the abscess; but as emetine was given in a number of the non-amoebic cases in which the medical treatment is mentioned in their notes, and is advocated by them in all cases of hepatitis, such negative results in no way exclude an amoebic origin. Indeed they quote Constantini as saying that thanks to emetine, a liver abscess will no longer contain living amoebae. This appears to be a far more likely explanation of their results than that two-thirds of Tonking cases are due to some other distinct unknown cause, yet produce precisely the same pathological changes and clinical course as amoebic cases seen elsewhere. If that is so their advocacy of the open operation, with eight to twelve times the mortality following aspiration in Korea (Ludlow) and in Calcutta, falls to the ground, in spite of the advanced surgical technique displayed in their work. The monograph is worthy of careful study.

Leonard Rogers.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

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[No. 10.

PELLAGRA AND PELLAGRA-LIKE CONDITIONS IN WARM CLIMATES.

By Hugh S. STANNUS, PhD., M.D., F.R.C.P.,
Sectional Editor, Tropical Diseases Bulletin.

SECTION I.*

It is just over two hundred years ago that the malady which later became known as Pellagra was first the object of study. During two centuries endemic pellagra has waxed and waned and then again flared up; of very considerable economic importance, the object of many observations, the subject of numerous investigations, the theme of divers theorizations, the disease remains to-day very much what it was in 1931 when R. H. TURNER remarked that "Pellagra (was) unique in the scarcity of accurate information, etiology uncertain, pathology obscure, diagnosis a matter of opinion, criteria of cure unknown, cause of death not understood."

The attention of Gaspar CASAL, a physician of Oviedo, was first drawn to the sickness about 1730, then known to the peasantry of the province of Asturia in North-West Spain as *Mal de la Rosa*.

About 1755 the disease was recognized under the name *Scorbuto Alpino* by Antonio PUJATI of Venice among the inhabitants of the village of Feltre in the province of Belluno but no account of the disease was published in Italy until Francesco FRAPOLLI of Milan set forth, in 1771, his observations made in Lombardy—"Animadversiones in morbum VULGO PELAGRAM"—thus introducing the name by which this scourge was known to the local peasants.

What had happened in Spain and Italy then happened in France. In 1829 Gustave HAMEAU, a country practitioner living in the Teste-de-Buch district, communicated to the Royal Society of Medicine, Bordeaux, observations he had been collecting during the previous ten years upon an affection among the miserable inhabitants living just to the south of the Bay of Arcachon which later proved to be none other than pellagra.

In the latter half of the century it was recognized successively in most of the southern states of Europe, then Asia Minor and Trans-

* Section II will appear in the November, 1936, issue, and Section III, with a list of references relating to Sections I-III, in the December, 1936, issue.

caucasias. During the present century attention has largely been focussed upon pellagra in the more southern areas of the United States. As far back as 1864 GRAY of New York published an account of a single case. Then in 1902 H. F. HARRIS put on record a case associated with ankylostomiasis. In 1907 six authors wrote upon pellagra in U.S.A., two years later in 1909 one hundred and fifty papers appeared on the subject and since then a vast literature has accumulated upon the disease.

To give some idea of the proportions this endemic may reach a few figures may be given. In the Province of Lombardy with a population of nearly one and a half millions, settled in 1,253 communes, there were in 1830 over 20,000 cases of pellagra, in some areas 3.5 per cent. of the population being affected. In 1881 among sixteen and a half millions total population of affected provinces there were over 100,000 pellagrins.

It was estimated by C. H. LAVINDER that between 1907 and 1912 there were 30,000 cases of pellagra in U.S.A. with a 30 per cent. mortality. In 1916 it was stated that there were in the southern states 150,000 cases with between ten and fifteen thousand deaths.

F. L. HOFFMAN (1933) gives the number of deaths from pellagra in the 5-year period ending 1932 as 30,000.

In Rumania, in 1918, the number of cases of pellagra was estimated at 70,000.

In Transcaucasia with a total population of 1,300,000 E. G. NAUCK (1933) estimated the number of cases of pellagra at between thirty and fifty thousand, the proportion of females to males being as 3 : 1.

It is interesting to note that though all these great endemics have been associated with maize as the chief article of diet, no endemic pellagra has been signalled from tropical countries, leaving out for the moment Egypt, even in those in which maize is the staple article of food.

When sporadic cases of pellagra were first discovered in France many authorities refused to acknowledge them as true pellagra and the same failure to realize sporadic pellagra persists to-day. In any case it may be a disease difficult of recognition unless the possibility be borne in mind. Unquestionably many cases all the world over pass unrecognized and die undiagnosed. With interest once awakened, pellagra will often be found if searched for, where previously unsuspected, as well exemplified by T. E. H. THAYSEN (1933) and others in Denmark.

With this brief reference to pellagra in temperate countries it is interesting on turning to warm countries and the tropics to find how rarely the disease has been observed, if we can judge by published reports.

In the following pages, although it cannot be considered to be exhaustive, some attempt has been made to collect together our knowledge of the geographical distribution of the disease.

AFRICA.—To F. PRUNER (1847) is usually ascribed the first description of cases of pellagra in Egypt though Billod at the time was disinclined to accept them as such.

Under the heading of "Leprosies" PRUNER said "Pellagra is sporadic in Egypt and such as we have studied it in Milan. We have seen three cases among the peasants one of whom presents to-day, twelve years after our first seeing him, paresis of the upper limbs, with retraction and muscular atrophy."

A. FIGARI (1865) wrote of a "venereal disease" in Lower Egypt exhibiting "a kind of Leprous Pellagra." HAMEAU's son recognized pellagra in a soldier returned from Algeria in the Hospital of St. André, Bordeaux, in 1850. DE BUCHERIE saw cases among the inhabitants of the Bu-Mezug Valley and among the inmates of the prisons at Ain and Bey. He thought that the first cases of pellagra to be recognized in Tunisia were those noted by ABEILLE in 1851 among Arabs, near Calle between Bône and Tunis. An account of pellagra in Algeria was published by J. de PIETRA SANTA (1880). In 1891 Surg. Capt. AYLES (cited by Sandwith) saw four cases of pellagra among 6,000 starving Arabs at Tokar on the Red Sea Coast.

Pellagra in Egypt is usually associated with the name of F. M. SANDWITH; writing in the British Journal of Dermatology (1898) he gave an account of his discovery of the disease in Egypt in 1893 and of subsequently seeing 500 cases among the maize-eating fellaheen. It is unnecessary to make further reference here to the disease in Egypt, the facts are well known.

It is stated that SANDWITH saw one or two cases of pellagra among the inmates of the leper colony on Robben Island; this statement is repeated by DRUMMOND but denied by CULVER (*vide infra*). With this doubtful exception and possibly a case from West Africa, referred to by SAMBON in a private letter, pellagra had never been recorded in Africa except from the Mediterranean area until H. S. STANNUS described in 1911 (1912) an outbreak which he had had under observation during the previous year among the inmates of the Central Prison at Zomba, Nyasaland. Two years later in a second communication, STANNUS (1913) gave a fairly full account of the disease and established the fact that a maize diet was not an essential factor in the aetiology of pellagra.

Soon after these earlier observations upon pellagra in African natives, P. A. NIGHTINGALE published (1912) an account of an outbreak of what he called "Zeism," to distinguish it from pellagra, among the inmates of the Victoria Gaol, Northern Rhodesia. Some 40 cases occurred among men whose main article of diet had been changed from "rapoko" (eleusin) to steam-milled mealie meal. When a return was made to the previous dietary the cases recovered and it was stated that no recurrence took place the next season.

NIGHTINGALE described the typical rash of pellagra, the typical affection of the tongue and lips, etc., but in ignorance of that disease he failed to recognize pellagra though others who read his account, including SAMBON (1913), immediately did so. NIGHTINGALE made a second communication two years later (1914).

J. DRUMMOND (1913) published the case of a tuberculous kaffir, admitted to the Addington Hospital, Durban, suffering from pellagrous rash and tongue, spasmodic diarrhoea, and albuminuria, emaciation, marked inco-ordination, loss of reflexes accompanied by delusions.

He mentioned that Dr. ADDISON had told him that he had seen numerous cases among rebel Zulu prisoners in the 1906 Natal rebellion. E. H. CLUVER (*vide infra*) refers to a communication from Dr. L. G. HAYDON, who put the number of cases at 150. Dr. KNIGHT also stated that he had seen cases in 1907 which closely conformed to the description of pellagra, in the Tugela Valley, they all died.

In 1912-13 an outbreak of pellagra occurred among the inmates of a mental institution at Pretoria, but an account of the outbreak did not appear until the publication of the Annual Health Report, Union of South Africa, June 1928. There were 60 patients, 15 of whom died:

skin manifestations and diarrhoea were the most prominent symptoms, together with "neuritis" of very variable severity. Three cases were reported, but not all published, by BARCROFT-ANDERSON, in East London gaol in 1913, 1914 and 1915; they are referred to by CLIVER (*vide infra*).

The case reported by J. A. MITCHELL (1914), a Transkei native transferred from East London prison to Capetown gaol with hemiplegia, rhinitis and scaly anaesthetic patches of dermatitis on the face, back, buttocks, forearms and legs, oedema of feet, spongy gums and tachycardia may have been a case of pellagra but it is much more suggestive of leprosy, in spite of a negative nasal swab.

E. W. D. SWIFT & H. E. BROWN, writing in 1914, stated that Dr. MACFARLANE remembered seeing five cases presenting symptoms of pellagra among the Basuto in 1906-7, and that in the Bloemfontein Asylum six cases were called to mind as having had signs of the disease during the eight years ended 1914.

These authors very truly remark "In Africa, therefore, ability to recognize the disease has played a large part in extending our knowledge of geographical distribution."

This phrase would have been even more true had it been stated conversely.

In 1920 DRUMMOND recognized another case of pellagra in DURBAN. He made enquiries throughout the Union of South Africa but could hear of no other case at that time. He saw yet a further case in 1922. These were the first Europeans to be so diagnosed in South Africa. But the same year PIPPER (1922) reported having seen two similar European cases on the Witwatersrand. He remarks that although maize is the staple diet of a large proportion of natives in South Africa, pellagra is unknown.

A. J. ORENSTEIN, in an investigation among miners on the Rand in 1927, discovered one European and one native case. The same year ROSS & RHODES made a diagnosis of pellagra in an Amatikulu native supposed to be suffering from leprosy, and three native cases were reported from the Addington Hospital, Durban.

In 1928 seven further native cases were diagnosed in the Addington Hospital, one was reported in the Krugersdorp gaol and one in the Queenstown municipal location in reply to a questionnaire sent to twenty-one District Surgeons attending prisons. These various cases are mentioned by E. H. CLIVER (1929), who further reports upon the outbreak of Pellagra in the Durban Prison Command when 64 cases came under observation: two had symptoms on admission; 25 within three months of admission; 10 in between one and two years; 13 in upwards of two years. The diet, which was deficient in protein, fat and carbohydrate, consisted of mealie-meal, rice, meat or beans, vegetable curry, bread and soup. CLIVER asks why did pellagra break out in this Durban prison and not in other prisons under similar conditions and finds no answer, except to say that "exposure to sunlight (Durban is in the subtropics) is known to be a contributory cause of pellagra, especially when associated with hard work."

It is pointed out that natives living on a diet which might well be considered as prescorbutic only develop scurvy when given the same diet in prison and it seems probable that the same is often true of natives who come into the gaols in a sub-pellagrous state. Unfortunately, the symptomatology in this outbreak is not dealt with and nothing further can be said about it.

In 1924 T. D. NAIR reported the case of a 35-year old Indian in Kenya suffering from recurring attacks over three years of a pellagrous-like rash, increasing in severity, associated with soreness of the tongue, intolerance of light, burning sensations, weakness, vertigo and irritability, and pain in the back and legs.

The same year F. H. COOKE (1924) published a short note upon a case in the convict prison at Accra, Gold Coast, a male aged 30, convicted nine months before. Five months later he was treated for diarrhoea and indigestion followed by burning and tingling in hands and feet; the diarrhoea returned, he lost appetite and became emaciated. Later still the dermatitis appeared on the dorsa of the hands and feet, forearms and face, and pains in the back and head were complained of. The man was a clerk in a European firm and could afford to live well. Nothing is said of the after history and no mention is made of the prison diet. No other cases were noted at the time.

In 1928 A. J. BOASE refers to 10 cases of pellagra discovered among native prisoners at Lira in Uganda, associated in two cases with xerophthalmia. As a result the malady was sought for in other prisoners in Uganda; 17 cases were found at Kampala and seven at Entebbe. The outbreak occurred, it was considered, as the result of the prison diet which consisted almost entirely of maize and beans, vegetables having been cut off the previous year.

The symptoms were typical and resembled those described by STANNUS—rash, sore tongue and soreness at the angles of the lips (here described as leucoplakia) seborrhoea about the nose, diarrhoea and psychosis. Pricking and burning of the feet were complained of.

After the restoration of vegetables, and the addition of meat to the diet, pellagra, it is stated, was banished.

The disease had not been previously recognized in Uganda but it is worthy of note that in 1924 J. P. MITCHEL had signalled an outbreak of what was called a scurvy-like condition, with oedema and watery diarrhoea, among prisoners at Luzira and Kampala which cleared up when meat and vegetables were added to the diet. A similar outbreak had also occurred in 1919 at Mbale prison.

A. MCKENZIE (1930) refers to the fact that in Tanganyika Territory one case only of pellagra had been recorded in the ten years 1919–28 and then reports four cases from the Songea district jail where the average number of inmates was seventeen, whose diet consisted of whole maize 2 lb., beans 5 oz., oil or ghee $\frac{1}{2}$ oz., salt $\frac{1}{2}$ oz. Little is said of symptoms but it was considered that they responded to the addition of meat, yeast and spinach to the dietary. The patients had been in the prison one, two, one and five months respectively.

In 1933 Dr. Cecily WILLIAMS gave an account of a very interesting condition met with at Accra on the Gold Coast under the heading "A nutritional disease of childhood associated with a maize diet." The syndrome, to use her own words, consisted of "oedema, chiefly of the hands and feet, followed by wasting, diarrhoea, irritability, sores chiefly of the mucous membranes and desquamation of areas of skin," and was due, it was believed, to an improper diet containing an excess of maize. Such a group of symptoms is certainly suggestive of pellagra and when the symptomatology described is studied in greater detail, a diagnosis of pellagra would seem to be inevitable. Miss WILLIAMS, however, came to exactly the opposite conclusion and gave a number of points in differential diagnosis from pellagra. Each of these points

was, however, based upon a lack of appreciation of the symptomatology of that disease as pointed out by STANNUS (1934). In 1935, however, Miss WILLIAMS under the title "Kwashiorkor" published a second article covering practically the same ground and repeating the same errors, an article which drew from STANNUS (1935) even more severe criticism.

These children presented some oedema of the extremities, a typical pellagrous dermatitis of areas of skin subject to trauma, with hyperpigmentation and desquamation; the extensor surfaces about the knees, ankles, wrists and elbows were affected, and sometimes the thighs and buttocks. Stomatitis and vaginitis were noted and the angles of the mouth and eyes were involved. Diarrhoea and mental irritability completed the picture of pellagra. Ninety per cent. of the children died.

It is worthy of note, however, that among some of the older children, who recovered, relapse occurred. The condition had been seen mostly in children between the ages of six months and four years—nine weeks and five years being the extremes of age in these cases. They had been ill-fed and given a gruel made from partially fermented white maize. Malaria, bronchitis and helminth infections were commonly present. A trace of albumen was found in the urine of some cases but there was no anaemia.

These are, I think one may say, obviously cases of pellagra in children.

In 1935 N. A. Dyce SHARP described a case which he recognized as similar to that portrayed by Dr. WILLIAMS but he also failed to realize the close similarity or identity with pellagra and believed the condition "constitutes a disease *sui generis*" and that there was no evidence of an avitaminosis. In his case there were mental irritability, oedema of hands and feet, enteritis, dermatitis above the wrists and ankles, on the knees, ankles and buttocks—all areas of pressure as he points out, while failing to recognize that this occurs typically in pellagra. There was also stomatitis but no anaemia, and no albuminuria; the reflexes were normal.

J. F. CARMAN (1935) in a letter referring to the cases described by Miss WILLIAMS and by Dyce SHARP states that a similar affection occurs in Kenya among the Kikuyu children aged 1 to 4 years. The symptoms are oedema of the feet and legs, hands and arms, or whole body including the face, associated with bronzing of the skin and patchy desquamation; diarrhoea is inconstant, albuminuria not present; all the children so affected died. He refers to the first case shown by Dr. SHAW at Nairobi and to those observed by R. U. GILLAN (1934-35) and by D. V. LATHAM (1935). GILLAN's cases were mostly breast fed Kikuyu children 3-4 years of age but several cases had been seen among adult females. The outstanding feature was marked oedema extending to the whole body which pitted on pressure.

There was a history of diarrhoea in most cases and the symptoms in some had been present for seven to nine months; in three of the twelve there was marked tachycardia, in one enlargement of the heart; pain on movement of the legs was marked, a considerable degree of anaemia was noted but stomatitis was not seen. The condition was considered by the author to be an infective one. While it is difficult to offer any very definite opinion upon the nature of these few cases, the condition would appear to be more closely allied to child beriberi; it does not resemble very closely that described by Miss WILLIAMS. A somewhat similar single case has been recorded by A. SWARBRECK (1932). A girl,

8 years of age, met with near the southern border of Abyssinia, exhibiting anasarca, ascites, albuminuria and anaemia, a dry scaly skin with purpuric areas, spongy bleeding gums, and dilated heart, which responded to a diet of vegetables, fruit, eggs, milk and meat. The natives recognized the sickness as one usually occurring in outbreaks and then invariably fatal. The author considered the case to be one of scurvy. The ordinary diet of these natives consisted of cows' milk, the pasturage being very poor.

Further references will be made later to the outbreak of pellagra described by STANNUS, also to pellagra among the Turkish prisoners of war in Egypt, described by BIGGAM and to the pellagra recorded by CORKILL among Sudanese millet eaters.

Search through the Annual Medical Reports of our African Colonies yields the following information in regard to cases of pellagra diagnosed: Gambia (1933) 10; Kenya (1932) 2; Nyasaland (1932) 88 in prison, 8 in Asylum, 5 in Hospital; (1933) 10; N. Rhodesia (1932) 12 in Broken Hill Gaol; (1933) 6; Zanzibar (1933) 16; Basutoland (1933) 3; Bechuanaland (1933) 1; Swaziland (1931), a pellagra-like condition is noted.

Pellagra is not mentioned in the reports for Lagos, Sierra Leone (1932), Nigeria (1932), Tanganyika (1932), Somaliland (1928), Mauritius (1932), Seychelles (1931).

One would not be surprised, however, if these figures were found to give a completely erroneous picture of the distribution of pellagra.

INDIA.—J. C. D. MEGAW & J. C. GUPTA (1927), in an article upon the geographical distribution of some diseases in India, basing their opinion on the replies made to a questionnaire sent to civil surgeons, say of pellagra there are only four doubtful cases from Lyallpur and one well-authenticated case from Calcutta by Col. CALVERT and one other possible case at Natore from Col. SANDES. It is interesting to note that in a later paper MEGAW (1936) gives the figure for cases of night-blindness in India at three and two-thirds millions, more than twice the number of cases of pulmonary tuberculosis. The figures given by MEGAW & GUPTA most assuredly give no idea of the incidence of pellagra in India. The probability is that when pellagra is unsuspected and when there are few able to recognize the disease, many cases go undiagnosed.

A. SWARUP (1930) has described a typical case of pellagra from Ballia, United Provinces. The patient was a non-maize eater and rarely partook of meat or fish. The typical affection of the skin was associated with pyorrhoea, stomatitis, erosions at the angles of the mouth, tremor of tongue, giddiness, sleeplessness, "pins and needles" in the hands and feet, exaggerated knee-jerks, and diarrhoea with a seasonal variation in symptoms.

In 1931 and again in 1933 J. LOWE has described an outbreak of pellagra among the inmates of the Leprosy Hospital at Dichpali, Hyderabad, Deccan. The disease was first noted in 1925. Twenty cases were diagnosed in the next six years, eleven women and nine men, though the proportion of female inmates to male was as 1:4. The ages were from 14 to 40 years. In 1931 twenty fresh cases occurred.

The skin manifestations, etc., were typical including the affection of the genitals and stomatitis in 50 per cent., but, except in seven cases, intestinal disturbances with diarrhoea were uncommon. In the same way nervous and mental symptoms though typical, were not common. Signs appeared in December, reached a maximum in March, and then cleared in April.

Fatal termination was associated with myocardial failure—tachycardia, dyspnoea and oedema of the feet. The diet provided by the Mission which looks after the Leper Hospital consisted of 1 lb. unmilled rice, a chapati of jawari (millet) flour, salt, ghee and one anna a day to purchase dhal, meat, fish or vegetable, if any available.

LOWE thinks that though such a diet shows a marked deficiency in protein and an excess of starch, it is much the same as that taken by the population outside the institution and believes that this points to some infection as the cause of pellagra.

T. K. RAMAN (1933) has published notes of four typical cases of pellagra at Guntar and remarks that no cases had been previously reported in the Madras Presidency.

B. H. RAJADHYAKSHA (1933) similarly notices a case in Bombay.

S. N. GUPTA (1935) a case at Lahore—female aged 20, who had lived on wheat, fruit, vegetables and ghee. The rash appeared on the hands, feet, forearms, legs, elbows, nose, cheeks and neck; the skin was dry and thickened. Diarrhoea, mental depression and marked anaemia completed the picture.

G. PANJA (1935) also cites a case in Calcutta, and N. S. H. MODY (1935) one at Poona very similar to that described by GUPTA.

CEYLON.—Pellagra is said not to occur in Ceylon. L. NICHOLLS (1934), who gained acquaintance with the disease in the West Indies stated that he had searched for cases of pellagra in the Ceylon prisons, vagrant asylums, poorhouses, etc., in vain.

RUSSIAN TURKESTAN.—A. J. WYJASNOWSKY (1934) mentions twenty cases of pellagra seen at the Psychiatric Hospital, Tashkent, of whom more than half died. In the same city J. KASIRSKY & L. BUROVA (1932) have had under their care, in the clinic for Tropical Diseases, forty-eight cases of pellagra. There was a mortality of 28 per cent. and of those who improved with better diet 30 per cent. relapsed the following spring.

CHINA.—S. R. ROBERTS (1912) quotes W. H. JEFFERYS as replying to a letter of enquiry to the effect that pellagra had never been reported from that country. He very wisely adds that this does not mean that the disease may not be present as he has been misled so often, and further, "I do not think that the average surgeon or physician would recognise pellagra unless on the lookout for it, or unless its great prevalence as a disease should force his attention." The first cases actually to be reported were four in number from Szechwan, Western China, by H. JOUVEAU-DUBREUIL (1919).

Since then a number of observations have been published and it may be of interest to summarize here some of the findings in regard to the disease as seen in the Far East. E. S. TYAU (1923) makes the interesting observation that among some 6,000 cases that had passed through the skin clinic at St. Luke's Hospital, Shanghai, in the previous eight years none has ever been suspected of pellagra, but that in the next year six cases had been recognized. All were males over forty years of age belonging to the poor working class, living on rice. "The skin of the backs of the hands, and of the cheeks was dry, thickened, rough and darkly pigmented." The tongue was dry and painful with reddened edges; there were aphthous ulcers on the fauces, loss of appetite, abdominal pain and diarrhoea; "burning sensations" in the soles of the feet and later nervous symptoms and fatal termination.

S. C. WU (1923) refers to the first case ever observed at Wuhu ; a male, 36 years of age, boatman. His illness began with " burning sensations " in both hands, followed by dermatitis of the backs of the hands and round the wrists and both feet, and later desquamation. There were also affection of the tongue and lips, loss of appetite, abdominal discomfort and diarrhoea ; numbness over the upper and lower extremities and chest, and lost reflexes. His diet consisted chiefly of rice, vegetables and only occasionally fish, never meat.

MU JUI-WU (1927) of Peiping, relates the case of a soldier, one and the only one of a party of ninety to develop the disease. They all partook of the same diet of rice, cabbage, bean-cure, bean-sprouts, spinach and turnip but seven months before being seen the patient had changed the diet to one consisting of millet and after two months maize with turnip, cabbage and spinach. His chief symptom was an intolerable " creeping sensation " in the legs with weakness. The dermatitis affected the hands, wrists, fore-arms and neck ; the tongue was glossy but there was no stomatitis ; a seborrhoeic affection of the skin of the face was noted. Symptoms cleared up when given a full diet and hydrochloric acid. Seven other similar cases were recognized later.

A. C. LAMBERT (1927) has published a case of pellagra in a Chinese woman at Honan suffering from a recto-vaginal fistula who had lived on wheat-meal and vegetables only. She presented the typical affection of the skin and tongue, associated with diarrhoea and nervous symptoms.

C. S. YANG & C. K. HU (1930) have described three interesting cases at Peiping. The first was a male aged 42, complaining of twelve months diarrhoea following an attack of dysentery, progressive weakness and numbness of the lower limbs. Examination revealed a palpable spleen, absent knee-jerks, marked anaemia, red cells two millions, and haemoglobin 32 per cent., hypochlorhydria, a normal urine, extensive ulceration and polyposis of the rectum, a pellagrous rash on the hands, nose and cheeks of six months standing, and a fissured tongue ; the stool was negative for *Bact. dysenteriae*. The diet had consisted practically entirely of cereals. When he was placed on a full diet the skin lesions disappeared and the haemoglobin rose to 82 per cent. The second case was a 14-year old servant girl the subject of pulmonary tuberculosis who had existed on a diet of cereals and vegetables. A typical rash on the backs of the hands was associated with diarrhoea. At the time she was seen the skin was still sensitive, as a small dose of U-V radiation on the abdomen caused an erythema to appear. The third case was a 24-year old male who had had chronic diarrhoea for over three years and had lived on cereals, green and salted vegetables. For eight months a pellagrous eruption had been present on the backs of the hands, forearms, back of the neck, face and sternum. There were also loss of weight and diminution of patellar response, but no anaemia and no other symptoms ; amoeba, ascaris and monilia infections present. Treatment with emetine, E.B.I., yatren, hydrochloric acid and a full diet was instituted and the skin lesions almost disappeared but the patient died a few days later, extensive ulceration of the bowel being found at necropsy.

C. S. YANG & K. K. HUANG (1934) describe 30 cases of pellagra among soldiers in an army camp at Nanking. The eruption was typically on the hands ; in 27 the mouth or tongue was affected, the tongue raw and the papillae red and swollen. Associated symptoms consisted of giddiness and irritability but no frank mental symptoms, numbness

and weakness of the lower extremities, pain in the calves on pressure ; loss of muscle tonus and oedema in a few ; variable knee-jerk ; scalding, darting pains and pins and needles in the soles of feet. Blurring of vision with reduced fields and night-blindness occurred in 25. In one case retrobulbar neuritis was noted. A "folliculitis" was present on the anterior part of the trunk. Diarrhoea was not present but there was often a history of it. Rectal examination revealed in a number of cases a proctitis. It was noteworthy that 29 of the 30 cases occurred in a cavalry camp and only one in the artillery camp. The diet was rice 200 catties, wheat flour 150, turnip 52, green cabbage 7, green bean 10, vegetable oil 4, pork 3, *i.e.*, low in protein and high in carbohydrate.

K. Y. YU (1934) describes the first three cases of pellagra in Manchuria. Typical rash was associated with raw and furred tongue, wasting, vulvitis and soreness at angles of mouth and about the anus, dizziness, epigastric pain, pyrosis, diarrhoea, pain in the back, diminished knee-jerk, some oedema of legs and mental depression. The diet consisted of practically nothing beyond millet, with or without salted vegetables and bean-sprouts. In one case there was active pulmonary tuberculosis.

KOREA.—R. M. WILSON (1925 and 1933) gives an interesting account of an outbreak of pellagra in Leper Asylums in Korea, he being unaware that the disease had been ever reported before from Korea or China, and certain that he had never seen the disease in the previous seventeen years. In 1925 lepers in the Kuangju Colony, with 600 inmates, began to complain of a brown, scaly, exfoliative rash on the arms and legs, like an iodine burn, which disappeared in the winter, to reappear in the spring. The relative frequency of symptoms was : scaly skin 17 ; erythema 15 ; stomatitis, sore gums and red tongue 15 ; nausea and vomiting 15 ; gastro-intestinal upsets 12 ; bloody stools 8 ; salivation 9 ; headache 13. Referring to the colony at Fusan in 1933 Wilson says "the red disease" has become very common both there and at Soonchun.

The exanthema was typical, affecting hands, neck, ankles, face, etc., associated at first with constipation and then with diarrhoea ; nervous symptoms were not marked and in only three was there insanity. In all there were six males and 30 females affected, some died but the number of deaths was not recorded. Relapses up to seven years had been noted. A questionnaire was sent to other Mission doctors in Korea: nine had not recognized pellagra, three had done so. K.S. OK of SEOUL had records showing two cases of true pellagra, and 19 cases of pellagroid [*sic*] in twelve years, otherwise the disease had not been seen outside institutions, though, it is stated, a pellagra-like condition had been observed among chronic alcoholics and in some suffering from "tuberculosis or other chronic illnesses in which diet and food absorption were at fault." Such cases are, of course, in reality pellagra.

The diet of these leper cases was a poor one, consisting of rice, vegetables, some beans and barley. It is rather remarkable that cases were said to improve when pork or codliver oil was added to the diet. Probably the rash would have improved in any case.

JAPAN.—M. ITOH (1925) refers to pellagra in Japan. He has collected references to sixty cases and himself has seen twelve ; cases were found on the main island, in Korea and Formosa, practically none in the north island. They occurred among ill-nourished workmen

living on a polished rice diet and were cured by giving rice husk. Of the sixty, 27 had diarrhoea, 18 stomatitis and indicanuria, 8 psychosis; many had signs of a peripheral neuritis, in 19 resembling beriberi.

S. TAKAHASHI *et al.* (1929) state, that over seventy cases of pellagra have been recorded in Japan. They give an account of four fresh cases seen at Hokkaido; three females aged 41, 45 and 54 and one male aged 43. They were typical cases with a history of gastro-intestinal disturbance. In one woman carcinoma of the pylorus was present.

PHILIPPINE ISLANDS.—J. N. RODRIGUEZ (1930) has published a case of pellagra from the Philippine Islands, and refers to one observed by D. D. Willets in 1910. The patient was a maize eater, a moderate taker of "tuba" but seldom got meat, chicken, or eggs and never milk. The illness began with pain and diarrhoea and the passage of tarry stools. He became very weak and thin, and developed an exanthem on the hands, forearms, nose, forehead and cheeks, with "burning sensations" and what is called a "prickly" seborrhoea. The tongue was sore and red at the tip and borders. Later the man became liable to depression or excitability.

T. DYCHITAN (1930) describes a condition called "Lapnus," a common affection in the island of Mindoro Philippines, which he thinks is pellagra.

It prevails from March to August, and disappears in September and has a mortality of 50 to 60 per cent. "Burning of the soles of the feet" is a prominent symptom followed by the development of a purplish-blue colour, later on a gray colour, and cornification then peeling of the skin. Other symptoms are stomatitis, gastralgia and pyrosis; pains in bones, formication in, and weakness of the lower limbs, increased knee-jerk, mental apathy and melancholia. Opacity of the cornea sometimes occurred. One would agree, obviously pellagra.

SIAM.—R. W. MENDELSON (1919 and 1923) writing of Siam believed that no cases of beriberi or pellagra had been reported from that country. He then describes a police recruit aged 27 suffering from a raw red tongue, dermatitis affecting the dorsa of the hands and feet and scrotum, associated with diarrhoea, the gait of polyneuritis, diminished knee-jerk but no oedema. MENDELSON suggests it was a case of mixed pellagra and beriberi but there seems little reason to believe it was anything more than a case of the former.

MALAY.—As far as I am aware no outbreak of pellagra has ever been recognized as such in south-eastern Asia and it has sometimes been said that pellagra does not occur. That the disease often goes unrecognized is very probable and borne out by the statement made by W. S. SHEPPARD of Singapore (1912). Until he had learned to recognize the disease, cases were labelled "a hitherto undescribed form of superficial dermatitis, probably tropical in origin," and one of his colleagues who had practised in the East for twenty years told him he had not infrequently noticed similar skin lesions without recognizing them for what they were, namely pellagra.

SHEPPARD remarks that during the years 1903 to 1907 he was constantly seeing cases in his wards at Singapore. He also notes that they came from the poorest classes and that they were rice eaters. J. V. LANDOR & R. A. PALLISTER (1935) to whose observations reference will be made later, state that sporadic cases of pellagra do occur among the general population of Malay and cite in brief three cases.

A. VISWALINGAM (1917) referred to the first case of pellagra seen by himself in Perak. He made other references to pellagra the next year (1918), at the Sixth Congress Far Eastern Association of Tropical Medicine (1925) and again later (1929). He discusses cases of pellagra occurring among Chinese and Indian labourers.

Attention is called to the characteristic symptom of "burning feet" called in Chinese "pee." The typical rash was associated with stomatitis, raw tongue, soreness at the angles of the mouth, diarrhoea, numbness and weakness in the limbs, oedema, absent knee-jerks and melancholia. He believed that the disease was due to a monotonous diet, deficient in vitamins, poor in protein with excess of carbohydrate, such a diet as the native takes—polished rice, salt dried fish, pork fat, tubers, some fresh or preserved leaves, with stale vinegar as a sauce. His theory is that many patients as the result of malaria, dysentery and ankylostomiasis suffer from defective digestion; prolonged dietetic deficiency leads to an intoxication which causes pellagra.

Returns for pellagra in the Annual Medical Reports are as follows: Strait Settlements (1932) 2; Hong Kong (1932) 24 Chinese; Singapore (1933) no mention; Johore, Kedah, Penang, Kelantan (1932) no mention. Federated Malay States (1933) none.

PAPUA.—W. M. STRONG (1932) mentions a number of cases of keratitis and panophthalmitis with night-blindness and signs suggestive of beriberi and scurvy among natives in a large centre of native employment, but no details are given. It would have been interesting to know if any of these cases resembled more closely pellagra.

DUTCH EAST INDIES.—W. G. BOSCH (1931) reports a single case of pellagra in Java, and C. D. DE LANGEN & B. DJOHAN (1935) a case in Sumatra (Batavia); a typical case in a male native aged 35, with exanthem, glossitis, mental depression, slight oedema of legs and marked anaemia.

SANDWICH cited NEIRET as reporting pellagra in New Caledonia.

AUSTRALIA.—S. J. CANTOR (1927) of Melbourne has published an account of five cases of pellagra in which the diagnosis rested upon a typical rash associated with mental symptoms. In one of the two male cases it is noted that the scrotum was also involved. N. PAUL (1928) of Sydney also reports a case of the disease, a man aged 46 who was edentulous and had lived for years on farinaceous foods and beer. He suffered from flatulence, dyspepsia and constipation, mental irritability, nervousness and depression, weakness and vertigo, soreness at the angles of the mouth, an ulcer on each eye, and a characteristic dermatitis on the hands, forearms, face and neck, which had recurred each summer for five or six years.

CENTRAL AMERICA.—Pellagra was reported in Mexico by D. NIBBI in 1882. Mortality statistics for Mexico quoted by S. R. ROBERTS (1912) returned one death from pellagra in Mexico City in 1909 and one in Monterey City in 1910. R. ROMERO (1931) states that the disease is common among the half-breeds of the province of Yucatan, who subsist on a deficient nourishment, together with alcohol. At Merida with a population of 80,000 the deaths from pellagra have been: 1911, 49; 1912, 71; 1913, 22; 1914, 81; 1915, 70; 1916, 91; 1917, 72; 1918, 29; 1919, 23; 1920, 21. GAUMER went so far as to say that 8 to 10 per cent. of the population was affected.

J. L. PHILLIPS also cited by ROBERTS refers to pellagra in the Panama Canal Zone and says that in the years 1909-11 32 cases had been diagnosed with 16 deaths.

Of the incidence of pellagra in South America little is known.

WEST INDIES.—The Annual Medical Reports make returns as follows: Trinidad & Tobago (1933) 1; St. Christopher & Nevis (1932) 1; St. Lucia (1933) 2; St. Vincent (1933) 0; Antigua (1933) 2; Dominica (1933) 0; Jamaica (1932), a few deaths from pellagra occurred; Bermuda (1932) 0; Barbados (1932-3) 100; Virgin Islands (1933) 0. British Honduras (1933) 1; British Guiana (1932) 0, may also be mentioned here.

In the 1932 Report for Bahamas the following figures are given for the years 1928 to 1932; 35, 86, 79, 81, 61, 35 and 27 cases of pellagra.

It is stated that pellagra is always more obvious when the citrus fruit crop fails owing to hurricane.

VELARDE (1932) saw five case of pellagra among 475 admissions to hospital in twelve months 1931-32 in the Island of Porto Rico.

It is interesting to remember that pellagra in Barbados was first described by C. G. MANNING in 1909 among the inmates of the asylum under the name of "Psilosis pigmentosa." The symptoms recounted consisted of a scurfy crusted skin over the points of the knuckles, elbows, knees and feet (except in those who wore shoes) more rarely on the back and chest, accompanied by anorexia, stripping of the mucous membrane of the tongue, cheeks and fauces, intractable diarrhoea and anaemia. The skin took on a "wine stained" tint and gangrene sometimes occurred. The patients became "silly and half-witted" but with good feeding, milk and cod-liver oil recovery took place.

Pellagra was first recognized in Jamaica in 1897 according to D. J. WILLIAMS. In 1905 4 per cent. of the total 1,050 inmates of the Asylum "were attacked with Pellagra in our wards." For twelve months no maize foods were allowed into the asylum but persons admitted during that time still got the disease.

RABIES.

A REVIEW OF RECENT ARTICLES. XXV.*

The rôle of the vampire bat in the transmission of rabies in Trinidad and in parts of South America is the subject of four papers. The first by PAWAN, the second by DE VERTEUIL & URICH, and the third by METIVIER refer mainly to Trinidad; the fourth by TORRES & LIMA is from South America. In all four papers the conclusion is arrived at that the vampire bat is the transmitting agent in these epidemics and epizootics.

PAWAN¹ first fixed his attention on the examination of bats which showed unusual behaviour, and tested these for rabies both histologically and by animal experiment. It is difficult to extract the exact figures from the paper, but it may be said that in practically all of the bats examined (roughly 38) there was definite evidence of the presence of rabies virus. Crossed immunity tests were then carried out with fixed virus and bat virus, with the result that fixed virus protected against bat virus, but bat virus protected only feebly against fixed virus. It was also found that fixed virus antiserum neutralized bat virus. The author then gives details of forty-seven cases of rabies, in all except one of which there was a history of bat bite, and draws attention to the fact that in all except one, sensory symptoms at the seat of the bite preceded paralysis and death. He then deals with preventive measures, such as bat-proofing of stables and dwelling houses, and describes the mode of attack of the bat. Finally he draws attention to the comparative rarity of canine rabies in Trinidad, as well as in Brazil. Whether this can be explained by assuming, (1) that the local virus is innocuous to canines, or (2) that dogs are never bitten in their sleep, or (3) that the dogs of these countries possess an immunity, he is not prepared to say.

DE VERTEUIL & URICH² cover somewhat similar ground. The latter is responsible for the zoological side of the investigation, and the former for the bionomics of the vampire bat (*Desmodus rufus*). They refer to the epizootics of paralytic rabies reported from Santa Catharina in Brazil since 1906, the transmitter of which was believed by HAUPT & REHAAG (1921) to be the vampire bat, *Desmodus rotundus*, and briefly describe the experience in Trinidad and its experimental elucidation by HURST & PAWAN. The characteristics and life history of *Desmodus rufus* are then described, with very interesting illustrations. It appears that the bat grasps the victim by the canine teeth, and with its sharp triangular upper incisors cuts through the skin; the blood is then lapped up, the tongue moving forwards and backwards like a piston. The bats may be destroyed in their feeding grounds, in the places where they digest, or in their roosting places. As regards the first locality advantage is taken of the fact that the bats "have the habit of biting

* For the twenty-fourth of this series see 1936, Vol. 33, p. 316.

¹ PAWAN (J. L.). The Transmission of Paralytic Rabies in Trinidad by the Vampire Bat (*Desmodus rotundus murinus* Wagner, 1840).—*Ann. Trop. Med. & Parasit.* 1936. Apr. 8. Vol. 30. No. 1. pp. 101-130. With 2 maps & 4 figs. on 1 plate. [56 refs.]

² DE VERTEUIL (Eric) & URICH (F. W.). The Study and Control of Paralytic Rabies transmitted by Bats in Trinidad, British West Indies.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Jan. 25. Vol. 29. No. 4. pp. 317-347. With 20 figs.

the same animals on the same spots nightly." Strychnine paste is applied to this area, and the bats are poisoned with ease. Trapping or fumigation is used in the digesting and the roosting places. The authors then describe experimental work which has been carried out both in Trinidad and in Brazil. Most of this has already been described in these reviews. But one observation emanating from Brazil is worthy of note: "Four desmodus bats after inoculation with bovine rabies virus, though showing no symptoms of rabies themselves, were capable of transmitting the infection to twenty-five healthy cattle within one to four months after experimental inoculation. One such bat, killed after five months, was proved to have its salivary gland infected." The authors rightly conclude that "Confirmation of this last experiment would mean not only a new addition to our knowledge of the virus of rabies, but would also further indicate the necessity for considering the carrier problem in connection with viruses in general." Usually, however, the bat dies after a period of a few days during which it has shown a "change of habit" and has appeared to be restlessly active. The authors believe that the disease is also transmitted from bat to bat, basing this conclusion on the occurrence of scars on the heads and bodies of captured bats, and upon the fact that when hungry they commonly attack each other. The enzootic may be controlled by bat destruction as described above, and for this, surveys of infected areas and of roosting places, of which illustrations and maps are given, are necessary. "The possible relation of fruit eating and other bats to the spread of the disease appears to require further investigation."

The paper by METIVIER³ covers similar ground, and deals with the veterinary aspects of the problem.

The observations made in Brazil are described *in extenso* by TORRES & LIMA,⁴ and a French summary of this paper appears in another journal.⁵ The larger paper is furnished with beautiful illustrations of the vampire bat and with photographs showing the bat as it attacks various animals. An historical account of the cattle epizootics in Brazil and of the work of HAUPT & REHAAG and others is also given. The experiments cover a wide range, and show that the vampire bat is without doubt the transmitter of the epizootics in question, the resulting disease being rabies of paralytic type.

i. Virus.

The size of the virus of rabies (fixed virus) has been examined by YAOI, KANAZAWA & SATO,⁶ using the technique devised by ELFORD. The brain of a rabbit killed in an advanced stage of rabies was ground with sand in a mortar, and suspended in a suitable diluent (Hartley's

³ METIVIER (H. V. M.). Paralytic Rabies in Livestock—*Jl. Comp. Path. & Therap.* 1935. Dec. 31. Vol. 48. No. 4. pp. 245-260. With 7 figs. [11 refs.]

⁴ TORRES (Sylvio) & LIMA (Esperidião de Queiroz). A raiva e sua transmissão por morcegos hematofagos infectados naturalmente.—*Rev. Depart. Nac. da Produção Animal*. Rio de Janeiro. 1935. Vol. 2. Nos. 1, 2 & 3. pp. 1-55. With 25 figs. on 11 plates & 1 folding diagram. [17 refs.] English summary.

⁵ TORRES (Sylvio). La rage et sa transmission par les vampires hématophages.—*Rev. Gén. de Méd. Vét.* 1936. Feb. 15. Vol. 45. No. 530. pp. 78-84.

⁶ YAOI (H.), KANAZAWA (K.) & SATO (K.). Ultrafiltration Experiments on the Virus of Rabies (Virus Fixe).—*Japanese Jl. Experim. Med.* 1936. Feb. 20. Vol. 14. No. 1. pp. 73-79. [11 refs.]

broth at pH 7.6). The centrifuged suspension, after filtration through sand and pulp, was subjected to filtration through collodion membranes of various grades, under pressure of nitrogen gas. In estimating the infectivity of the filtrates tests were made with ten-fold dilutions of the fluid using guineapigs. The authors found that at a pH of 7.6 the virus passed through membranes with an average pore diameter of not less than 0.2μ . "We assume therefore the end point of the rabies virus as 0.2μ , and regard the particle size of the virus as 0.1 to 0.15μ ."

DEFRIES & CAMPBELL⁷ find that the New York strain of fixed virus differs slightly from the Paris strain, both in its minimum lethal dose, and in its incubation period when inoculated into rabbits and white mice. The lethal dose of the New York strain is of the order of one in 10^6 , whilst that of the Paris strain is one in 10^4 . The average incubation of the New York strain in rabbits was 10 days, whilst that of the Paris strain was 15 days. In a further experiment it appeared that subpassage intramuscularly through white mice increased the pathogenicity of the Paris strain.

During the course of experiments on the serotherapy of rabies in mice (this *Bulletin*, 1935, Vol. 32, p. 618) PROCA & JONNESCO⁸ found that fixed virus recovered from mice which had succumbed after prolonged incubation appeared to be modified. They have examined two such strains in some detail, and find that they are attenuated and differ from ordinary fixed virus in giving rise to a larger number of Negri bodies. This in their opinion is not due solely to the long sojourn of the fixed virus in the tissues of the mouse. The modification appears to be a true mutation.

BOZZELLI⁹ in continuation of work already reviewed (*ante*, p. 318), on the effects of inoculation of mixtures of fixed and street virus, comes to the conclusion that fixed virus has lost its proclivity for spreading centrifugally or centripetally along the nerve trunks whilst street virus retains this property. On the contrary fixed virus has an increased elective virulence for the central nervous system.

From experiments conducted by VIOLLE & LIVON¹⁰ it appears that exposure to 1 per cent. ricinoleate of sodium for 45 minutes at room temperature destroys fixed virus. They now intend to examine the immunizing properties of this killed virus.

REMLINGER & BAILLY¹¹ noting this result have tested the effects of the same substance on street virus. The conclusions arrived at from six experiments are identical. "This identity of action does not allow one to envisage the possibility of a rapid and easy method of differential diagnosis between the two viruses (ricino-diagnostic)."

Following their investigation of the effects of low temperatures on rabies virus (this *Bulletin*, 1935, Vol. 32, p. 174) in which it was shown

⁷ DEFRIES (R. D.) & CAMPBELL (T. C.). The Relative Pathogenicity of Two Strains of Fixed Rabies Virus for White Mice and Rabbits.—*Canadian Public Health J.* 1935. Dec. Vol. 26. No. 12. pp. 615-618.

⁸ PROCA (G.) & JONNESCO (D.). Sur une modification durable du virus rabique de passage.—*C. R. Soc. Biol.* 1935. Vol. 120. No. 40. pp. 1274-1276.

⁹ BOZZELLI (Roberto). Contributo allo studio delle "setteviriti" da virus rabbico fisso e di strada.—*Boll. Istituto Sieroterap. Milanese*. 1936. Apr. Vol. 15. No. 4. pp. 260-265. [35 refs.] German summary.

¹⁰ VIOLLE (Henri) & LIVON (Jean). Action du ricinoléate de sodium sur le virus de la rage.—*C. R. Soc. Biol.* 1936. Vol. 121. No. 2. pp. 100-102.

¹¹ REMLINGER (P.) & BAILLY (J.). Action du ricinoléate de sodium sur les virus de la rage et de la maladie d'Aujeszky.—*C. R. Soc. Biol.* 1936. Vol. 122. No. 16. pp. 24-25.

that in frozen condition the virus maintained virulence for at least 600 days and a suggestion by LÉPINE that freezing should be substituted for glycerine in the conservation of cords (*C. R. Acad. Sci.* 1935, Vol. 201, p. 172), REMLINGER & BAILLY¹² point out that much experimentation would be necessary in order to determine how the various properties of the vaccine were affected. These are being carried out at Tangiers.

In the third of a series of articles on Pseudo-rabies (this *Bulletin*, 1934, Vol. 31, p. 146 and 1935, Vol. 32, p. 175) HURST¹³ deals with the disease as it occurs in monkeys. The experiments described in the second of the series were performed on rabbits. It will be remembered that in relation to the rabbit the virus was found to be pantropic, *i.e.*, it readily attacks cells derived from any embryonic layer. In the monkey (*Macacus mulatta*), however, it behaves as a strict neurotrope, only nerve and glial cells being affected. Intracerebral, intracisternal inoculation, and in most instances intrasciatic inoculation led to an infection which was usually fatal. No infection in a limited number of experiments followed intradermal, intramuscular or intravenous inoculation. The distribution of the virus after inoculation was carefully followed, and the histological appearances of the various tissues studied. Certain cortical areas—the pyriform area, the cornu ammonis, the island of Reil, the lower lip of the sylvian fissure and the basal surface of the frontal lobe were more affected than other parts of the nerve axis. “The blood and the cerebrospinal fluid play no apparent part in disseminating the virus.” It thus appears that the rabbit and the monkey differ markedly in their relation to pseudo-rabies. The author states that the pig and the monkey are possessed of greater resistance than are most common and domestic animals, and points out that in the two groups of animals the mechanism of resistance is wholly different. In the pig “a definite local lesion develops, associated presumably, as in the rabbit, with great multiplication of the virus, only small amounts are necessary to infect by the skin.” During the course of infection the virus is present in the blood; lesions may be found in lymph glands, spleen, etc. The mortality rate is less than 5 per cent. Nasal secretions and urine become infective. “In short, in the pig, the virus exhibits multiple affinities, it easily contracts the disease, but survives because its nervous system is relatively resistant. In the monkey, on the contrary, there is no local reaction; intramuscular and intravenous inoculation are ineffective; but if the virus enters nervous tissue, the nervous system may be invaded, and in many instances the issue is a fatal one. The blood is not infected, and the animal is not infective to its cage mate. There are no visceral lesions. In brief, in the monkey the nervous system is probably less resistant to infection than in the pig, but since the virus behaves in this species as a strict neurotrope it does not readily reach the susceptible tissue, destruction of which is incompatible with life.”

¹²REMLINGER (P.) & BAILLY (J.) La congélation des moelles rabiques est-elle applicable à la pratique de la vaccination?—*C. R. Soc. Biol.* 1936. Vol. 121. No. 15. pp. 1614–1616.

¹³HURST (E. Weston). Studies on Pseudorabies (Infectious Bulbar Paralysis, Mad Itch). III. The Disease in the Rhesus Monkey, *Macaca mulatta*.—*Jl. Experim. Med.* 1936. Mar. 1. Vol. 63. No. 3. pp. 449–463. With 6 figs. on 2 plates.

The first section of a paper on AUJESZKY's disease by GERLACH and SCHWEINBURG¹⁴ already reviewed (*ante*, p. 320) now appears in another journal. The second section¹⁵ appears in the *Wiener Klinische Wochenschrift*. This deals with the influence of physical and chemical agencies on the virus. It is filterable, passes through Chamberland bougies L₁, L₂ and L₃, but not through Berkefeld V bougies, nor collodion membranes. It is in general rather less resistant to drying and chemical agents than are other viruses. It differs markedly from rabies virus in that on subpassage through guineapigs the incubation period gradually increases until finally the virus becomes avirulent. In twenty instances transference to a cagemate took place without any evidence of wounding. Thus "It is beyond doubt that transference by simple contact can occur." Only exceptionally has infection followed biting. The authors have succeeded in conveying the disease to rabbits by subcutaneous and intra-muscular inoculation by the saliva of a cow suffering from the disease. Crossed immunity tests differentiate the virus from rabies virus.

The occurrence of two cases of AUJESZKY's disease in cattle in France is reported by CRUVEILHIER, TRUCHE & VIALA.¹⁶ These were characterized by sudden onset, and rapid course, shortness of the period of paralysis, and extreme pruritus.

ii. Symptomatology.

The case of a man bitten by a dog suffering from "chien fou" which occurred in the Oubangui (West Africa), is described by LE BIHAN.¹⁷ The only unusual symptoms were an absence of deep sensation, and diminution in the tendinous reflexes.

A case of hydrophobia which occurred after treatment, during the course of an attack of malaria is discussed by LÜCK.¹⁸

DE MELLO¹⁹ describes two cases of rabies, in the first of which the symptoms were those of an ascending paralysis, and in the second the clinical picture was of the usual type.

iii. Pathology.

The observation of QUAST (this *Bulletin*, 1926, Vol. 23, p. 693) that after a course of treatment with living fixed virus, the virus may be present in the brain in a latent condition without causing any symptoms of rabies has been the subject of much controversy. Some workers

¹⁴ GERLACH (F.) & SCHWEINBURG (F.). Experimentelle Untersuchungen ueber die Aujeszky'sche Krankheit (Pseudowut). I. Mitteilung.—*Ztschr. f. Infektionshr. d. Haustiere*. 1935. Vol. 48. No. 4. pp. 270-310. With 17 figs. & 8 charts [51 refs.]

¹⁵ GERLACH (Franz) & SCHWEINBURG (Fritz). Experimentelle Untersuchungen ueber die Aujeszky'sche Krankheit (Pseudowut). II. Mitteilung.—*Wien. Klin. Woch.* 1936. May 1. Vol. 49. No. 18. pp. 551-554.

¹⁶ CRUVEILHIER (L.), TRUCHE (C.) & VIALA (C.). Note sur deux cas de maladie d'Aujeszky observés en France.—*Ann. Inst. Pasteur*. 1936. Apr. Vol. 56. No. 4. pp. 395-400.

¹⁷ LE BIHAN (A.). Un cas de rage humaine dans l'Oubangui.—*Ann. de Méd. et de Pharm. Colon.* 1935. Oct.-Nov.-Dec. Vol. 33. No. 4. pp. 1075-1079.

¹⁸ LÜCK (O.). Zur Kasuistik der antirabischen Impfungen.—*Rev. Microbiol., Epidémiol. et Parasit.* 1935. Vol. 14. No. 4. [In Russian pp. 417-418. German summary p. 418.]

¹⁹ DE MELLO (A. L. Nobre). Sobre dois casos de raiva humana.—*Folha Med.* 1936. Jan. 5. Vol. 17. No. 1. p. 1.

support QUAST, others have failed to find evidence supporting his contention. It is important for the diagnosis of the type of rabies from which a patient has died, to ascertain whether the presence of a virus, which behaves on subpassage as a fixed virus, is indicative of death from the fixed virus used in the treatment, or whether it is merely the indication of a storage of latent fixed virus in the sense of QUAST.

BUSSON²⁰ now reports two cases amongst rabbits (previously infected with syphilis), in the brains of which, when the animals were killed twenty-eight and thirty-five days after the completion of treatment by HÖGYES living virus, fixed virus was proved by further passage to be present. These rabbits had shown no symptoms of rabies. A number of other rabbits had been similarly treated, and these gave a negative finding. BUSSON consequently believes that the transmission of fixed virus to the central nervous system as a result of treatment is not a normal occurrence. He is not convinced that the virus found was innocuous. The incubation periods on subpassage were long, and it is possible that the rabbits, though showing no symptoms at the time when they were killed, would have developed rabies later. The conditions under which the fixed virus penetrates into the central nervous system depend in his opinion upon idiosyncrasies in the patient on the one hand, and upon the character of the vaccine on the other.

JONNESCO²¹ describes a further case of natural immunity in the dog (this *Bulletin*, 1935, Vol. 32, p. 609). He believes that the resistance is due to the destruction or the attenuation of the virus by contact with living nerve cells, although the formation of antibodies, and the action of leucocytic enzymes appear to play a part.

iv. *Methods of treatment and statistics.*

A sixth review of statistics furnished to the League of Nations by the different institutes is submitted by MCKENDRICK.²² The main fact which emerges is the remarkable degree of homogeneity indicated in the following Table, which includes statistics compiled from the series of six reviews.

From an examination of this Table it appears that the numbers in the non-European group (for which the percentage mortality is 0.72) are in general insufficient to detect superiority of one treatment as compared with another when the excess relative efficiency of the better treatment is about 10 or 15 per cent. : whilst in the case of Europeans (for which the average mortality is 0.16) the corresponding figure is about 25 per cent. It is thus reasonable to conclude that it is unlikely that a difference of efficiency of more than 25 per cent. between any two methods of treatment exists. Thus the conclusion is arrived at that the figures so far available are not yet sufficient to detect the existence of differences of less than 25 per cent. It may at first sight seem surprising that figures amounting in all to about half a million

²⁰ BUSSON (B.). Das Uebertreten und die Speicherung von Virus fixe im Zentralnervensystem geimpfter Menschen und Tiere.—*Zent. f. Bakt.* I. Abt. Orig. 1935 Dec. 9. Vol. 135. No. 6. pp. 331-341.

²¹ JONNESCO (Démètre). Contribution à l'étude de l'immunité naturelle du chien contre la rage.—*C. R. Soc. Biol.* 1936. Vol. 121. No. 12. pp. 1203-1205.

²² MCKENDRICK (A. G.). A Sixth Analytical Review of Reports from Pasteur Institutes on the Results of Anti-Rabies Treatment.—*Quarterly Bull. Health Organisation. League of Nations.* Geneva. 1935. Dec. Vol. 4. No. 4. pp. 752-786.

			Number treated	Deaths		Mortality per cent.
				Observed	Calculated*	
<i>Europeans</i>						
1.	Cords	...	40,522	66	66	0.16
2.	Dilutions	...	43,218	85	71	0.20
3.	Killed phenol	...	34,034	51	56	0.15
4.	Live phenol	...	2,268	5	4	0.22
5.	Fermi's vacc.	...	5,123	12	8	0.23
6.	Fermi's sero-vaccine	...	255	0	0.4	0
7.	Heated vaccine	...	67,664	120	111	0.18
8.	Killed ether	...	46,547	65	76	0.14
9.	Mixed	...	41,358	51	68	0.12
10.	Yatren *	...	5,384	13	9	0.24
			286,373	468	469	0.16
<i>Non-Europeans.</i>						
1.	Cords	...	33,915	225	244	0.66
3.	Killed phenol	...	185,766	1,353	1,334	0.73
			219,681	1,578	1,578	0.72

* Calculated from the average mortality.

are insufficient to demonstrate differences of this order in the efficiencies of various methods of treatment. "The controlling factor is the mortality rate; the lower this may be, the greater the number of patients required to demonstrate variations. In the case of rabies [statistics], as shown above, the mortality rate [amongst the treated] may be as low as 0.16 per cent." It appears also that the liability to paralytic accident is 1 in 10,372 in the case of those treated by killed vaccines, as compared with 1 in 2,632, amongst those treated by live vaccines, and 1 in 11,637 amongst those treated by heated vaccines (Babes).

The statistics for the Instituto Camara Pestana (Lisbon) for the years 1921-34 are considered by PEREIRA DA SILVA.²³ During this period four different methods were employed and the combined results were as follows. The statistics refer only to persons belonging to categories A, B and C.

Years	Method	Number treated	Deaths	Percentage mortality
1921-24	Dried cords (Pasteur)	7,528	25	0.33
1924-25	Dilutions (Hogyes)	4,207	16	0.38
1925-27	Ether vaccine (Alvisatos-Pereira da Silva)	1,164	2	0.17
1925-34	Killed phenol vaccine (Semple-Pereira da Silva)	8,461	4	0.047

²³ PEREIRA DA SILVA (E.). Le traitement antirabique à l'Institut Câmara Pestana (1921-1934).—*Arquivos Inst. Bact. Camara Pestana*. 1936. Vol. 7. No. 2. pp. 225-234. With 2 graphs.

[It is to be noted that the numbers treated annually have fallen from a maximum of 3272 in 1925 to 254 in 1934, and that the numbers of dogs' brains examined and proved to contain the virus has similarly declined from 230 in 1925 to 3 in 1934. It would consequently be unwise to assume that the reduction in mortality was due solely to the alterations in the method of treatment. The author expresses no opinion.]

VAZQUEZ-COLET²⁴ reports upon antirabic treatment at Manila during the period 1914-33. From 1914 to 1927 the vaccine consisted of 3-day cords emulsified in 0.5 per cent. phenolized saline. During the remaining years a 1 per cent. emulsion of fresh brain and cord in carbolized salt solution was employed. In each case treatment was given for 25 days.

During the period 1914-27 when 3-day cords were employed "there were treated 6,266 cases bitten by dogs, of which 5,716 were Filipinos, and 8 of them (Filipinos) developed hydrophobia. Only 3,450 of the Filipinos bitten by dogs took complete treatment, and of the 8 that developed hydrophobia only 3 took complete treatment, giving a death rate of 0.08 per cent. From 1928-33 carbolized vaccine was used. During this period there were treated 11,343 cases bitten by dogs, of which 10,743 were Filipinos and 6 of them (Filipinos) developed rabies. Only 4,700 of the Filipinos bitten by dogs took complete treatment, and of the 6 cases that developed only 2 received complete treatment giving a death rate of 0.04 per cent. The figures show that with the use of the dried cord the incidence of hydrophobia was twice as great as with the use of carbolized vaccine."

The author in his summary states that "a comparison of the efficiency of the two types of vaccine employed brings out the fact that with the use of the 3-day cord the incidence of hydrophobia among the cases was twice as great as with the use of the carbolized vaccine." [As a matter of fact a difference in mortalities as great or greater than that observed would be likely to occur about once in two times on the assumption that the two vaccines were in fact equally efficacious. It is amazing that in the present state of knowledge the author should have laid any weight upon this observation.]

In Palestine²⁵ the treatment of rabies has been completely decentralized. There are now 31 provincial centres. During 1934, 1,039 bitten persons have received a full course of antirabic treatment by Semple's method, and amongst these 5 cases of rabies have occurred. The mortality rate is 0.48 per cent., as compared with 0.13 in the previous year. No neuromparalytic accidents have been observed.

v. Rabies in Animals.

The question of the control of rabies in wild animals with special reference to the conditions prevailing in South Africa was discussed at the Pan-African Health Conference at Johannesburg.²⁶ It was

²⁴ VAZQUEZ-COLET (Ana). The Pasteur Antirabic Treatment at the Bureau of Science, Manila.—*Philippine Jl. Sci.* 1935. Aug. Vol. 57. No. 4. pp. 435-442.

²⁵ PALESTINE, DEPARTMENT OF HEALTH. ANNUAL REPORT FOR THE YEAR 1934. [Rabies pp. 40, 92-95.]

²⁶ QUARTERLY BULLETIN OF THE HEALTH ORGANISATION. LEAGUE OF NATIONS. Geneva. 1936. Mar. Vol. 5. No. 1. pp. 161-165.—Animal Diseases communicable to Man. A. Rabies. [Report of Committee on Diseases conveyed by Animals to Man and Resolutions of Pan-African Health Conference, Johannesburg, Nov. 20-30, 1935. pp. 161-162.] DU TOIT, (P. J.). Wild Carnivora as Carriers of Rabies. [Annex pp. 162-165.]

recommended "that further research be undertaken in connection with the transmission and eradication of rabies, and that the biology of the small carnivora should be studied with a view to the elaboration of some method of destroying them." In an annex the rôle played in the spread of rabies in South Africa by animals belonging to the family *Viverridae* (meerkat) is discussed by DU TOIT.

It is proposed to study the practical aspects of prophylactic vaccination of dogs in Indochina.²⁷ An installation has been set up for this purpose. The formulated vaccine of PLANTUREUX will be used.

In a general paper SCHOENING²⁸ discusses the place of prophylactic immunization of dogs in the control of canine rabies. If treatment were cent. per cent. effective, and if every dog were treated, then prophylactic immunization of dogs would be successful as a sole means of controlling rabies. As this is not the case, prophylaxis must be supplemented by licensing, quarantine and the impounding and disposal of stray dogs.

vi. Miscellaneous.

LEVADITI and SCHOEN²⁹ find that street virus has an "elective affinity" for the neoplastic cells of Pearce's carcinoma. Tumours were grafted in the anterior chamber of the eye and in the testicle, and street virus was inoculated into the brain or under the cornea of the opposite side. Absolutely typical Negri bodies appeared in the neoplastic cells. Thus in the opinion of the authors Negriogenesis is not confined solely to neurones and corneal epithelium, but occurs also in epithelial new formations.

GREVAL³⁰ draws attention to the fact that in certain instances biting animals may have an unusually high degree of infectivity, and quotes a case in which 3 out of 4 persons bitten by the same dog succumbed to rabies. One received treatment, but it was not commenced until 55 days after the bite.

He then describes an untreated case which terminated fatally. The patient was owner of the dog in question, and was in the habit of playing with it. "He admitted that he had often been licked whilst playing with the dog, and said that the only possible way he might have got any dog's saliva in contact with abrasions on his skin was possibly when he rubbed his cheeks and hands after shaving." There were no visible cuts or abrasions when he was examined, and he was not sent for treatment. The case was an unfortunate one, but the evidence is hardly strong enough to lead one to the conclusion that infection through the unbroken skin is possible. Greval then discusses 4 cases of sequelae after treatment by Semple's vaccine of which two showed paralytic symptoms; the first involved the bladder and rectum, and the second was of the usual bulbar type. The symptoms in both cases were temporary, and recovery was complete.

²⁷ RECUEIL DE MÉDECINE VÉTÉRINAIRE EXOTIQUE. 1935. July-Sept. Vol. 8. No. 3. pp. 118-123.—Organisation d'un service d'étude de la vaccination antirabique des chiens en Indochine.

²⁸ SCHOENING (H. W.). Can the Health Officer Safely Utilise Prophylactic Immunization as the Sole Means to control Canine Rabies?—*Amer. J. Public Health*. 1936. Mar. Vol. 26. No. 3. pp. 265-267.

²⁹ LEVADITI (Constantin) & SCHOEN (Rachel). Virus rabique et cellules néoplasiques.—*C. R. Acad. Sci.* 1936. Feb. 24. Vol. 202. No. 8. pp. 702-704. With 3 figs.

³⁰ GREVAL (S. D. S.). Against Orthodoxies in Rabies.—*Indian Med. Gaz.* 1936. Feb. Vol. 71. No. 2. pp. 69-74. [15 refs.]

The pathogenity of the Chinese Hamster to fixed virus rabies is the subject of a communication by YEN.³¹ The incubation period varied between 5 and 8 days, and the symptomatic picture was similar to that observed in the rabbit. Negri bodies measuring 4 to 6 μ were found in the usual situations. The virus has been carried to the 10th passage in this animal.

An outbreak of rabies is reported by GODDING³² from British Somaliland. Four persons in the Bovama district have died of the disease, and various species of animals including an Aardwolf (*Proteles cristatus*) have been involved. It is stated that rabies is endemic in Abyssinia, and that the incidence of the disease in Harar and Jigjiga is at the moment above normal. Every precaution has been taken to prevent further spread of the disease, but "Abyssinia remains a potent source of infection." This is the first time that rabies has been reported from the Somaliland Protectorate.

A. G. McKendrick.

³¹ YEN (Albert C. H.). Experimental Virus Infections in Chinese Hamster. I. Susceptibility to Fixed Rabies Virus.—*Proc. Soc. Experim. Biol. & Med.* 1936. Apr. Vol. 34. No. 3. pp. 315–318.

³² SOMALILAND PROTECTORATE : ANNUAL MEDICAL & SANITARY REPORT FOR THE YEAR ENDING 31ST DECEMBER, 1934. Appendix II. pp. 93–98.—Report on an Outbreak of Rabies at Borama, June–October, 1934 [GODDING (H. C.)].

MALARIA.

SINTON (J. A.). **What Malaria costs India, Nationally, Socially and Economically.**—*Records of the Malaria Survey of India.* 1935. Sept. & Dec. Vol. 5. Nos. 3 & 4. pp. 223-264; 413-489. 1936. Mar. Vol. 6. No. 1. pp. 91-169. With 1 chart. [10 pages of refs.]

Colonel Sinton has collected in this series of papers a great deal which has been written about the evil effects of malaria in India and in other parts of the world. He has attempted to assess in terms of money the value of the work the malaria-stricken people leave undone, the loss on the work they do badly, the cost of the medicine they drink, the cost of their funeral expenses and so on, and has added the results together to make an enormous total. Alcohol, rats and other evils have been treated statistically in a similar manner, but we are indebted to Colonel Sinton for telling us what is often forgotten in many a malaria-survey which records the spleen measurements to several places of decimals—that is, the effect of the disease upon the health and happiness of the people.

Colonel Sinton makes out his bill of charges under four heads: (1) The effect of malaria upon the natural increase of the population. (2) Its effect upon the health and vitality of the people. (3) Its effect upon the social, intellectual and political progress of the nation. (4) Its effect upon the economic, agricultural and industrial development of the country. He then attempts to estimate the financial loss which the disease causes to India and whether it would pay to undertake measures to control it. He finds that malaria lowers the birth-rate by reducing the number of conceptions and by causing abortions and still-births. He quotes evidence that impotence is common in water-logged villages and in the malarious parts of the Terai. In a record of the year 1870, concerning villages along the Western Jumna Canal, it was stated "The unfruitfulness of women is a subject of common remark, and the consequent difficulty of inducing other Jat families to give their daughters to the men of Panipat and the environs of the canals generally is very great." As regards abortions, it has been estimated that, in Bengal alone, the potential population is lessened annually by 800,000 persons from this cause, and that 37·8 per cent. of these abortions are due to malaria.

Malaria raises the death rate not only directly, but also indirectly; by lowering the general vitality of a community it prepares the ground for other diseases, and is responsible for many a death of which it is not actually the immediate cause. The author considers that "it seems probable that malaria, by its direct and indirect actions, is responsible for at least 2,000,000 deaths each year in India."

One must admit that Colonel Sinton has demonstrated that the population of India would be very much larger than it is, if it were not for the annual sacrifice which is paid to malaria; but will this argument stir the administrator to enthusiastic action? On page 465, one reads, "During the 60 years which have elapsed since the first Indian census was taken in 1872, the population of this country has increased by 46·6 per cent. . . . As a result, a problem of the greatest national importance has arisen, as to how these increasing millions are to gain a decent livelihood in the future." The author's answer to this question

is that the disease cannot be considered as a healthy pruning; it attacks both fit and unfit indiscriminately, and those it does not kill, it often leaves maimed and crippled to swell the ranks of the unfit.

In connexion with the evil influence of malaria on the physical development of children and adults we find a very pleasing quotation, evidently from America: "Every once in a while somebody rises up to criticise modern parents for devoting too much time to their children's physical being (as compared with their spiritual and educational). . . . Our righteous ancestors disregarded their bodies and paid attention to their souls, and it might be added that by neglecting their bodies in the interests of their souls, they beat us to heaven by an average of twenty years."

The author computes the number of persons suffering annually from malaria, in India, at the high figure of one hundred million; in addition to this there are those suffering from "an indirect morbidity pre-disposed to by this disease which may be between 25 and 75 million cases. . . . Apart from the economic loss caused by the action of malaria upon the mental state of the population, this disease has the deplorable effect of hindering greatly the intellectual, social and national development of many people afflicted by it." The cost of medical attendance in respect of malaria in India is assessed at £15 million per annum, the loss in wages at £18 million, the loss from 'post-malarial inefficiency' at £22 to £55 million, 'unprofitable funeral expenses' £500,000, economic loss from deaths directly due to malaria £67½ million sterling. Beyond all this there are the financial losses of the community in respect of the value of houses and land, and a hundred other things, to be taken into consideration. Agriculture loses incalculable sums because of the action of malaria in causing loss of work, and the abandonment, imperfect cultivation, or retarded development of large fertile tracts. Why is malaria productive of so much suffering in rural India when it causes comparatively little illness in Africa among natives living in hyperendemic areas, as Garnham of Kenya and Wilson of Tanganyika have told us? The loss caused by malaria to the development of mining industries, and the effects of malaria on the railways are next taken into consideration. So the bill grows, and one cannot help wondering what would happen if it could be liquidated—if malaria could be conjured away. Would India be transformed into a Garden of Eden, or would there be a hitch somewhere, the kind of horrid snag which comes into stories like "The Monkey's Paw"?

William Fletcher.

SINTON (J. A.). **Malarial Prevalence in its Relationship to the Problems of Food Supply and Increasing Population in India.**—*Records of the Malaria Survey of India*. 1936. Mar. Vol. 6. No. 1. pp. 53–65. [34 refs.]

The increase of population has outstripped food production. Fertile tracts remain uncultivated because of malaria. Poor living and malaria have made the peasants so dull and lethargic that they are without initiative. "It would pay India to commence a more intensive anti-malaria campaign."

The population of India is now about 353,000,000. It has nearly doubled within the last 60 years. It has been said by the Government Agricultural Chemist, Mr. Viswa Nath, that India's food production is

sufficient for only two-thirds of her population. This means an exceptionally low standard of living. The solution of this problem depends largely upon (1) An increased production of food stuffs ; (2) An increase in industrialism and the development of the natural resources of the country.

Compared with agriculture, the other industries of India are of minor importance, no single factor is so important as the increase of the locally grown food supply. Much of the most fertile land is also the most malarious, and malaria is the chief disease which hinders the expansion of agriculture. Italy in reclaiming the Campagna has recently given an example of the way in which this problem can be solved. In India, many large fertile tracts have remained uncultivated because of malaria. Care must be taken that no hasty attempts to colonize are undertaken before the areas have been rendered fit for occupation by means of antimalaria work. In the scheme for the colonization of Palestine after the war, swampy, fertile tracts were acquired by the promoters, and they were occupied without preparation. The results were disastrous, but, by the introduction of proper malaria-control measures, disaster was eventually transformed into success. The colonizing agencies now realize that it is a bad practice to settle people in malarious areas until provision has been made to render these areas habitable. There seems little hope of any satisfactory advance in the extension and improvement of agriculture in India "so long as the rural populations continue to bear this enormous burden of malarial sickness, that is sapping both their physical and mental activities."

W. F.

NIEUWENHUIS (A. W.). Körperliche und kulturelle Volksehtartung in Gebieten endemischer Malaria. Mittel-Sumatra. [Physical and Cultural Race Degeneration in Endemic Malarial Regions, Central Sumatra.]—*Janus*. 1934. Vol. 38. pp. 121-136 ; 163-178 ; 193-211 and 1935. Vol. 39. pp. 37-48 ; 94-104 ; 127-134 ; 212-218. With 1 folding map.

The author considers that central Sumatra offers very good facilities for studying the problems stated in the title. Because endemic malaria is the most important of the deleterious influences there, and it is rampant in the eastern plains, but the western Barisan high mountains are free from endemic malaria. As a result the Malayan population of the eastern half is very small, whereas the mountains of the west are very populous ; also in culture the same difference is noted, high in the west, low in the east.

He quotes the observations of Doorenbos on the vectors of malaria in Sumatra. 243,137 mosquitos were caught and classified on the east coast of Sumatra ; the result of 80,667 dissections is described. The highest infection rates for the different species of anopheles are :—

					Per cent.
<i>M. sinensis</i> ...	Londut, December 1930	...	5 out of	41	12.2
<i>C. kochi</i> ...	Ajer Poetih, 1 October 1926	...	9 "	59	15.3
<i>M. aconita</i> ...	Colt Estate, April 1928	...	3 "	26	11.5
<i>N. leucosphyra</i>	K. Plasa, October 1925	...	4 "	101	4.0
<i>N. maculatus</i>	Londut, November 1928	...	9 "	53	17.0

He deals also with the anthropological studies in Sumatra by Drs. Kleiweg de Zwaan and Alfred Maas.

This monograph is a mine of information and deals with most important scientific and practical problems. It should be consulted in the original by those interested.

E. D. W. Greig.

RIVISTA DI MALARIOLOGIA. Sez. I. 1935. Vol. 14. No. 6. Supplement. 114 pp.—Conferenze sulla malaria tenute nell'agosto del 1935. [Conference on Malaria, Rome, August 1935.]

Malaria therapy and research. Immunity due to latent infection. Importance of repeated inoculation in the production of immunity. Prophylaxis by drugs. Dangers of plasmoquine. Disappearance of malaria due to change in race of anopheles. Housing and malaria. Testing drugs on bird malarias. Kikuth's belief in direct action of quinine. Integral bonification and "*bonifica umana preepidemica*."

The first paper in this series is written by M. CIUCA; it concerns the service which therapeutic malaria has rendered to the proper understanding of the disease. Investigations are being carried out in Rumania at the malaria-therapy station, established with the help of the Rockefeller Foundation, in connexion with the mental hospital at Socola.

The second paper deals with immunity in malaria, and is by the same author. As illustrations of the development of immunity in a population he instances the immunity of adult Indians in certain parts of the United Provinces and elsewhere, which has been acquired at the cost of the sacrifice of an enormous number of children in infancy. [Communal immunity in Africa is attained without so great a sacrifice, see WILSON, below p. 765]. The author has found that a latent infection is present in 60 per cent. of benign tertian immunes and in 100 per cent. of subtertian and quartan immunes. These figures were obtained as the result of tests made by inoculating patients' blood into non-immunes; but it does not always follow that an individual is entirely free from parasites because no infection results from the inoculation of his blood. A latent infection following a first injection does not necessarily confer immunity. The important factor in immunity is repeated inoculation.

The third paper, which concerns the relative value of different drugs, is also by M. CIUCA. As a result of his studies at Socola, he agrees with the malaria commission of the League of Nations that the method of choice in clinical prophylaxis is the administration of a daily dose of 5 grains of quinine during residence in a malarious district and for several months after leaving it. A daily dose of 0.1 gram of atebrin could be employed in the same way, but it has the disadvantage of staining the skin yellow. The author treated a number of patients, some suffering from naturally contracted and some from therapeutic malaria, with the following doses: (a) Atebrin 0.3 gram, (b) Quinine 1 gram, (c) Atebrin 0.3+quinine 0.5 gram, (d) Atebrin 0.3+plasmoquine 0.02 gram. The duration of the treatment was 7 days in each case. In the treatment of benign tertian and quartan, quinine and atebrin were equally efficacious, but there were fewer relapses after atebrin. In the treatment of subtertian, atebrin appeared to be somewhat better than quinine, and it should be employed in all severe attacks which are resistant to that alkaloid. Atebrin and quinine given together did not act better than either drug given alone. In quartan malaria there were fewer relapses after atebrin+plasmoquine than after other drugs, but this was not the case in benign tertian (but

see SINTON, *ante*, p. 688). In any case, according to the author, the mixture atebirin+plasmoquine is so apt to be toxic that it should never be employed.

The fourth and fifth papers are by L. W. HACKETT concerning the Races of *Anopheles maculipennis*, the Natural Disappearance of Malaria and the Methods of Attacking Malaria. Discussing biological methods of control he writes that animal barriers can be of use only when those anopheles are concerned which feed by instinct on animals; such, for example are *messeae*, *melanoon*, *typicus* and *atroparvus*; *elutus* and *labranchiae* are never deviated by cattle. On the east coast of England where cases of malaria occurred during the war, JAMES noticed that anopheles stayed in houses and continued to feed during the winter. This he ascribed to the darkness and poor ventilation of the houses which encouraged the mosquitoes to remain there. Now it is known that this phenomenon was due, not to the faulty character of the houses, but to the presence of the *atroparvus* race of *A. maculipennis* which does not go into hibernation, but shelters in dwellings and continues to feed through the winter. In central England, another race is present which winters in uninhabited buildings, ceases to feed and goes into complete hibernation. Disappearance of malaria is sometimes due to a change in the anopheline fauna. For example, in the Po delta *elutus* was formerly present, but irrigation and agriculture have modified conditions in favour of *atroparvus*, which is not a carrier in this district, and *atroparvus* has ousted *elutus*, to the great benefit of the district. In the polders of the Low Countries, *atroparvus* breeds in the brackish lagoons, but when the lagoons are cut off from the sea and fresh water is continually running into them, they gradually become fresh water lakes and *atroparvus* is supplanted by *messeae*. At Durazzo, the port of Albania, there was a large brackish lagoon which could not be treated in this way because no large rivers ran into it. The author dealt with this by fixing automatic sluice-gates which admitted the sea water but did not let it out again, and, in the course of two years, the salt content of the lake had increased, through evaporation, to such an extent that *elutus* could breed in it no longer. Again, the author has observed, during the last two years, the gradual replacement of *elutus* and *labranchiae* by *messeae* and *melanoon* in the Pontine Marshes. *Maculipennis* does not appear to be the only anopheline which consists of several races. There are others, for example, *ludlowi*, *hyrcanus*, *maculatus* and *pseudopunctipennis* which behave as dangerous carriers in some countries, but are quite harmless in others, and it may be that these species, too, contain different races.

W. KIKUTH contributed a paper on Experimental Immunology and the testing of drugs on the malarias of birds and monkeys. He found that plasmoquine, administered to Java sparrows infected with *Haemoproteus*, caused the disappearance of gametocytes from the blood. They soon returned, because the plasmoquine had no effect on the schizonts in the tissues, but, when the schizonticide, atebirin, was given in addition, the schizonts were destroyed and there were no more relapses. The author does not believe that either quinine or the synthetic drugs act indirectly; he states that more and more evidence is being accumulated in favour of the direct action of these drugs on the parasites.

Dr. LUTRARIO described the Hygiene Organisation of the League of Nations which includes the Malaria Commission, of which he is President, the Cancer Commission and other bodies.

Professor OTTOLENGHI dealt with the question of prophylaxis by means of drugs, and gave instances of excellent results which had been obtained by giving courses of mass treatment at the end of the spring, before the beginning of the malaria season. Very good results were obtained at Ferrare with a ten-day course of plasmoquine and quinine. (First 2 days, plasmoquine 0.03+quinine sulphate 0.9. Third day, plasmoquine 0.02+quinine 0.6. Fourth to tenth day, plasmoquine 0.01+quinine 0.3 gram.) Atebrin+plasmoquine has also been used with success in this *bonifica umana preepidemica*.

Professor OTTOLENGHI also discussed the question of *grande bonification* and emphasized the importance of regulating the supply and flow of water. The disappearance of *elutus* from the region of Ferrare he ascribes to a change in the chemical composition of the water which has been rendered less saline owing to abundant irrigation with river water. Malaria control is only a part of bonification. When the work of reclamation is first begun, it is necessary to push on with the main drainage schemes as quickly as possible and during this period it is necessary to prosecute vigorous antimalaria operations, but as the land is developed and settled with men and beasts, less and less antimalaria work is necessary. W. F.

PECORI (G.) & ESCALAR (G.). Relazione della campagna antimalarica nell'Agro Romano durante l'anno 1934. [Report of the Antimalaria Campaign in Agro Romano during 1934.]—*Riv. di Malariologia*. Sez. I. 1935. Vol. 14. No. 6. pp. 469-519. With 2 graphs & 1 map.

The main points only of this detailed report can be referred to here. By the beginning of the year there were 34 sanitary stations each with its medical officer and staff and the whole under the central Directorate of the Government Bureau of Hygiene. In the Agro were 101 schools with 8,000 pupils. As in preceding years the campaign included quinization, mechanical protection, destruction of larvae and adult mosquitoes, and zooprophylaxis, and these were applied according to the gravity of the endemicity, the prevalence of anopheles and so forth. Antilarval measures were carried out in 20 zones, quinine prophylaxis in 15, and the malaria attack rate was only 0.7 per cent. Blood examinations totalled 70,000. Incidence, including primary cases and relapses, was 1.99 per cent. (1.98 in 1933); primary cases were 0.9 per cent. of the population (0.6 in 1933); this increase applied to benign tertian infections only, malignant tertian definitely was less, so that the author states "the incidence of infection continued, as in the two preceding years, to fall." Zooprophylaxis, at Ardea, has resulted in a further diminution of malaria among the inhabitants of this village, from 7.5 per cent. in 1933 to 5.3; prior to the institution of this measure the incidence was 32.2 per cent. H. H. S.

SERGEANT (Edm.), SERGEANT (Et.), PARROT (L.) & CATANEI (A.). Etude épidémiologique du paludisme. Technique des indices endémiques. [The Technique of Endemic Indices.]—*Arch. Inst. Pasteur d'Algérie*. 1935. Dec. Vol. 13. No. 4. pp. 566-576. With 7 figs. (1 map) & 3 plates.

This is an instructional pamphlet.

It is necessary, before undertaking a malaria campaign, to estimate the amount of malaria present in the locality. This is done by determining the following indexes: (1) *The Splenic Index*: this is the percentage of children under 15 with enlarged spleens palpable below the costal margin. (2) *The Splenometric Index*: the projection of each spleen below the costal margin is measured in finger breadths. Spleens up to one finger-breadth are measured as 1, spleens up to 2 finger-breadths as 2, and so on; all spleens above 5 finger-breadths are measured as 6. The average size of the enlarged spleens is given by adding together all the finger-breadths and dividing by the number of enlarged spleens examined. The splenometric index is obtained by multiplying this figure by the splenic index. That is to say, the splenometric index = the percentage of enlarged spleens \times the average size of the enlarged spleens measured in finger-breadths. For example: if there were 40 per cent. of enlarged spleens and the average size were 2 finger-breadths, then, the splenometric index would be 40×2 . It indicates not only the prevalence of enlarged spleens, but also the degree of enlargement. It is particularly useful in assessing the value of anti-malaria measures in places where the splenic index is high and the spleens are very large. Here, the splenic index alone would not detect an improvement indicated only by a general decrease in size of the enlarged spleens, if they remained palpable. (3) *The Parasite Index*: is the percentage of children under 15 in whose blood parasites are found during a single examination of a thick drop preparation for a fixed period of 5 to 10 minutes. (4) *The Endemic Index of Ross*: This is obtained as follows: the number of children with parasites in their blood \div the number of children with enlarged spleens but no parasites, is divided by the total number of children examined. This index is a useful complement to the splenic and parasite indexes and is particularly useful in the comparison of different localities. (5) *The Sporozoite Index*: this is the percentage of anopheles with sporozoites in their salivary glands. The following technique is recommended: remove the legs and wings of the mosquito; fix the thorax by transfixion with a pin; seize the head with fine forceps and pull it off; two shining drops are visible at the back of the head, these are the salivary glands; spread them out on a slide. Sometimes the glands remain in the thorax; in this case squeeze the thorax, and make a film with the fluid which exudes at the place where the head was cut off. It is advisable to do this in any case, even when the glands come away with the head.

W. F.

QUINTANA OTERO (Fernando). El problema del paludismo en la cuenca del Esla (Zamora). [*The Malaria Problem in the Esla Valley (Zamora).*—*Medicina Paises Cálidos*. Madrid. 1936. Apr. Vol. 9. No. 4. pp. 160–187. With 5 figs. & 1 map.]

As a result of investigations carried out in the Zamora Province the author concludes that among the riparian settlements of the Esla dam conditions for malaria are present, larvae of *A. maculipennis* have been seen in the pools and deposits about the houses, and adult forms in the stables and pigsties near human dwellings in some of the settlements; cases of indigenous malaria are met with, that among the people are infected persons coming from other parts when the malaria endemicity is great; that this conjunction of circumstances aggravates the local liability to infection.

In the Aliste valley, however, malaria is not endemic, and the splenic index is nil. There are excellent breeding sites for mosquitoes in Vegalatrabe, Vide and Losacino—small collections of water, clear, undisturbed and covered abundantly with vegetation—but they hardly persist during the spring and in the summer disappear altogether; if there are heavy rains they collect again in September. Hence usually one, perhaps two generations only of mosquitoes are produced in the spring, and again in the autumn. This interruption of the biological cycle during summer is held to account for the absence of endemicity. The following are, in sum, the author's conclusions:—

1. Anophelism at the present time among those living in the Esla valley is small and limited to part of the warm season.

2. In the pasture lands the mosquitoes breed abundantly and continue to do so in the summer.

3. Among the inhabitants malaria is practically entirely sporadic.

4. The dam is a source of danger only in so far as it increases the number of breeding sites or prevents those already existing from drying up.

5. The remedies are (1) to drain the borders so that collections are not left when the dam is emptied, (2) to treat cases.

H. H. S.

CARR (Henry P.), MANDEKOS (A.) & BARBER (M. A.). **Malaria Studies in Greece. A Survey of Malaria Morbidity in a Region of East Macedonia.**—*Ann. Trop. Med. & Parasit.* 1935. Dec. 18. Vol. 29. No. 4. pp. 399–405.

There is a high degree of tolerance of infection in this district; though many were infected, few were incapacitated.

The purpose of this survey was to obtain information as to the amount of actual illness due to malaria in East Macedonia. Nineteen villages representing various degrees of malarial endemicity were visited during the malaria season, between August and October. The presence of parasites or an enlarged spleen did not necessarily indicate illness: in some of the villages, 60 per cent. of the children who were quite fit to attend school had parasites in their blood, and 80 per cent. had enlarged spleens. "With regard to the amount of recognizable clinical malaria in the whole survey, the totals . . . indicate less than 2 per cent. clinically ill, including parasite positives and negatives. Among parasite positives the percentage is under 1." These percentages represent the findings at one visit. Repeated visits would doubtless have detected a much larger number of sick. In a group of villages with a population of 2,089 where malaria was highly endemic, only 3·5 per cent. were found wholly or partly incapacitated, at the time the survey was made, and not all of these cases were suffering from malaria. There was less illness in villages where endemicity was low than in those where it was high.

W. F.

TIMBRES (Harry G.). **Studies on Malaria in Villages in Western Bengal.**—*Records of the Malaria Survey of India.* 1935. Dec. Vol. 5. No. 4. pp. 345–370. With 5 graphs & 1 map.

A. philippinensis is the chief vector. Benign tertian and quartan infections are common.

This malaria survey was made in 7 villages situated in the District of Birbhum, Bengal. It was continued for 89 weeks, from July 1932 to April 1934. It was made possible through the help of the Institute of

Rural Reconstruction, which is the Village Work Department of the Visva-Bharati founded by Dr. Rabindranath TAGORE and the American Friends Service Committee of Philadelphia who lent the services of the author. The population of the villages numbered 2,582. It is on the whole a hyperendemic area. The distribution of types of malaria in the autumn and spring epidemics was as follows: August to December, *vivax* 58.2 per cent., *falciparum* 33.2, *malariae* 8.6; January to May, *vivax* 47 per cent., *malariae* 31.2, *falciparum* 21.8.

A. culicifacies, *A. minimus* and *A. aconitus*, carriers in other parts of India, were relatively scarce and never found infected. The chief carrier in the summer and autumn was *A. philippinensis*; the only other carriers of importance were *A. annularis* and *A. pallidus*. *A. pallidus* was the only species found infected during the cold-weather months preceding the spring epidemic. *A. annularis* was very numerous at this time; *A. philippinensis* was very scarce. All three species bred in still, clean, shady water with aquatic vegetation. Rice fields were not important breeding places.

An experiment with plasmoquine and quinine was carried on for six months in the four central villages of the group. "The object was to see if partial 'plasmoquinization' of those persons most likely to harbour gametocytes would have any noticeable effect in reducing the incidence of malaria." During the time the drugs were being given there was less malaria, and the sporozoite rate was lower in this group of villages than in the three peripheral villages forming the control group, but the author is of opinion that the results of the experiment were inconclusive.

W. F.

SINTON (J. A.). "Man-Made" Malaria in India.—*Indian Med. Gaz.* 1936. Apr. Vol. 71. No. 4. pp. 181-187. [37 refs.]

Emphasizes the harm done by large irrigation schemes planned without due regard to drainage.

The effects of human activities in increasing the prevalence of malaria are considered under the following heads:—

A. Conditions leading to economic stress and lowered resistance. Example: severe economic stress which follows the water-logging sometimes caused by large engineering works.

B. Introduction of human carriers into a healthy area, or of susceptibles into a malarious area. Example: aggregations of tropical labour in connexion with large industrial, engineering, mining, or other projects. The infection is liable to spread from the labourers to the surrounding inhabitants.

C. Measures resulting in an increase of anopheles. (a) Local Activities. Examples: Ornamental tanks and fountains in Delhi. Cisterns and wells in many towns. Borrow-pits, bad drainage, badly controlled water supply, dripping taps. (b) Wide-spread activities causing increase of water. Examples: Local excavations in connexion with engineering works. Obstruction to natural drainage by the construction of roads and railways. Introduction of large irrigation projects without the provision of proper drainage. Improper use of irrigation water. Leaking irrigation channels. The water-logging Board of the Punjab have issued a statement of the "principles to be observed in the preparation of canal projects," but, unfortunately, these principles appear to have been ignored, and enormous losses have resulted—decreased prosperity of the population, decreased fertility of the land and decreased health

of the people have been caused by the neglect of proper precautions. (c) Widespread activities causing decrease of water. The great example of this is in lower Bengal where large areas which, in the past, were covered by silt-bearing water from the Ganges at certain seasons of the year, have now been deprived of this irrigation. This inundation-irrigation was stopped by the building of embankments, roads and railways, with the result that anopheles breed in the pools and dead ends of the old drainage-canals, and, for lack of river-silt, the land is impoverished. The people are sunk in poverty and a vast proportion of them suffers each year from recurring attacks of malaria. The author discusses the remedies for these malaria-producing conditions, and emphasizes the importance of co-operation between different government departments. W. F.

MORIN (Henry G. S.). A propos de certains échecs de la prophylaxie antilarvaire du paludisme. [**Certain Failures of Antilarva Methods of Prevention in Malaria.**]—*Bull. Soc. Méd.-Chirurg. Indochine*. 1936. Mar. Vol. 14. No. 3. pp. 327-329. With 4 figs.

An illustrated warning that failure to achieve adequate results by drainage, as an antimalaria measure, is sometimes attributable to faulty construction and even more to negligence in upkeep.

Norman White.

HEALTH BRIEFS. 1935 Nov. 15. Vol. 12. No. 11. pp. 3-4.—Malaria Control.

EJERCITO (Antonio). Present Orientation in the Control of Malaria in Tropical Countries.—*Jl. Philippine Islands Med. Assoc.* 1936. Feb. Vol. 16. No. 2. pp. 61-71. With 5 figs. on 2 plates.

SCHWIETERT. Ueber einen neuen Fall von endemischer Malaria tertiara. [**Another Case of Endemic Malaria (in Germany).**]—*Deut. Med. Woch.* 1936. May 29. Vol. 62. No. 22. p. 898.

From March to August 1935 the patient was working in Emden, but enjoyed good health all the time. He then moved to Weillburg an der Lahn and a month later fell sick with a shivering attack, the next day there was no fever, but repeatedly thereafter, every other day, he had fever, and the blood picture and the symptoms were those of the classical tertian malaria. The symptoms cleared up when quinine was given but relapse occurred soon after he left hospital. The author discusses the question of place of infection and concludes that it must have been Emden, which is one of the few remaining endemic foci in Germany to-day. H. H. S.

DESPUJOLS (B. P.). Le paludisme autochtone dans la 18e région. [**Indigenous Malaria in Bordeaux.**]—*Rev. Service Santé Milit.* formerly *Arch. Méd. et Pharm. Milit.* 1936. Mar. Vol. 104. No. 3. pp. 419-445. With 3 figs. [12-refs.]

The city of Bordeaux is situated amid great marshes on the banks of the Garonne; during the Middle Ages, there were repeated epidemics whenever any work was undertaken to drain these marshes and enlarge the town. In 1895, there was an outbreak when the docks were being

extended. In 1921, six cases were observed in children who had never left the town; 6 cases occurred at the same time among soldiers, 3 of whom were living in the camp of Songe, 20 kilometres from Bordeaux. In 1934, there was a small epidemic in this same camp during the second half of August. It has been suggested that an indigenous strain is responsible, but the author thinks that the small outbreaks are probably due to infections introduced by African troops and by soldiers returning from the colonies.

W. F.

SIEBURGH (G.). De malaria te Oosthaven.—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1936. Mar. 10. Vol. 76. No. 10. pp. 612-628. With 2 maps & 6 figs. on 2 plates.

FADDA (Siro). La malaria nelle colonie italiane dell'Africa Orientale.—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1936. Feb. Vol. 17. No. 2. pp. 105-114. With 2 figs.

BARBER (M. A.) & RICE (J. B.). **Malaria Studies in Greece. The Relation of Housing to Malaria in Certain Villages of East Macedonia.**—*Amer. Jl. Hyg.* 1935. Nov. Vol. 22. No. 3. pp. 512-538. With 4 figs.

It made no difference, in this region, whether the house was old and dark, or new and light. Only one thing mattered, and that was screening.

These observations were made in certain plains of Eastern Macedonia where *A. elutus* is the chief and, probably, the only important vector of malaria. *A. superpictus* is very uncommon and *A. maculipennis*, though abundant, is very rarely infected. The habits of sporozoite-infected *elutus* are the same as those of the uninfected. Infected *elutus* are found in stables nearly as often as in houses. Two different types of houses, the old and the new intermingled in the same village, were compared. The observations were continued for two years. With regard to density of anopheles, sporozoite rate, and human-positive percentage of blood meals, *elutus* in old and in new houses showed no significant difference. *Maculipennis* was more common in the old dark houses, but was very rarely infected. The proportion of infants infected was practically the same in both types of house. "The results on the whole do not offer much encouragement to the hope that improvement in housing, other than by screening, would be an effective anti-malaria measure. One could not even say that the house is the locus of infection, unless one includes in it the larger numbers of people sleeping outside."

W. F.

IRAQ, GOVERNMENT OF: Ministry of Interior. Public Health Directorate. **A Compilation of Vital Statistics of Iraq 1935.** [Malaria pp. 19-24. With 1 folding map & 1 folding chart; 32-35.]

The Public Health Adviser, Dr. T. B. HEGGS, reports that malaria is the most important disease in Iraq. The spleen rate in the town of Baghdad is *nil*, but in the outlying country it is 30 per cent. In Basrah it is 17 per cent. in the spring and 40 per cent. in the autumn. Subtertian is the commonest form in lower Iraq, and benign tertian in middle Iraq; quartan is limited to the hills of Kurdistan. The malaria season lasts from May to November, with a remission in September.

Owing to river floods, malaria was epidemic in 1926, 1929 and 1931. An average of 83 grains of quinine was issued to each of the 277,823 persons treated during 1934. W. F.

KATTAN (H.). **Malaria in Palestine. 1911-1935.**—*Jl. Egyptian Med. Assoc.* 1935. Dec. Vol. 18. No. 12. pp. 802-813. With 3 charts.

The following figures represent the percentage of malaria cases among the patients attending :—

(1) Three years 1911-14	...	...	...	32 per cent.
(2) Three years 1914-17	...	...	...	47 "
(3) Five years 1919-23	...	...	...	19 "
(4) Five years 1923-28	...	...	...	9 "

W. F.

SCHILLING (Claus). Die Malariaepidemie auf Ceylon 1934/1935 nach den Berichten von Briercliffe und Gill.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Feb. Vol. 40. No. 2. pp. 51-63. With 1 fig.

MAURITIUS, COLONY OF: ANNUAL REPORT ON THE MEDICAL AND HEALTH DEPARTMENT 1ST JANUARY TO 31ST DECEMBER 1934 [KIRK (J. Balfour), Director]. Appendix III. pp. 53-56.—**Annual Report of the Malaria Branch for the Year 1934** [McGREGOR (Lewis J.), M.O. i/c Hookworm & Malaria Branch].

A drought which occurred early in the year 1934 was responsible for a reduction in the number of cases of malaria. The disease has shown a tendency to extend up into the healthy highlands, and the policy adopted during 1934 was to concentrate all efforts in the Planes Wilhems district which is situated in the centre of the island above the 600-foot contour. Work in the coastal lowlands was limited to the maintenance of existing drains, keeping them free from vegetation and the like. The spleen rate for the upland area investigated was 10.5, but, in spite of this, very few anopheline breeding places were found. The Malaria Officer is of opinion that the malaria in this area is the residuum of the outbreak which occurred as the result of the cyclone in 1931. All three types of malaria were found in almost equal proportion; benign tertian being rather more common, and quartan rather less common than subtertian. *A. costalis* is much the most common mosquito, but *A. funestus* and *A. maculipennis* are also found.

W. F.

BECHUANALAND PROTECTORATE. ANNUAL MEDICAL AND SANITARY REPORT FOR THE YEAR 1934 [DYKE (H. W.), P.M.O.]. [**Malaria** pp. 12-17.]

Regular prophylactic quinine is recommended. Malaria occurs in cycles. An epidemic, following several healthy years and associated with famine, occurred in the Kalahari.

"Notwithstanding the disfavour with which quinine prophylaxis is regarded by many authorities, it is strongly advocated in this territory as being the only prophylactic available to the majority of the population. Some of the worst cases of malaria one has seen among Europeans recently have occurred in those who refused to take quinine because they had been

told, or read, that quinine in many malarious countries was now entirely discarded on the advice of eminent malariologists! Whereas the experience in Ngamiland where malaria is endemic is that officials and others who take quinine regularly throughout the summer months are seldom incapacitated for their work even though when on journeys they were exposed to certain and unavoidable infection."

The incidence of malaria was very low from 1930 to 1934. During the latter year it remained low in the eastern part of the Protectorate, but in the western (Kalahari) part a very serious epidemic occurred. The resistance of the population "was lowered owing to lack of food, locusts having destroyed their cultivated crops . . . and because of foot-and-mouth disease they had been unable to export their cattle which is their normal source of income." The epidemic was preceded by heavy and continued rain. The case mortality was about 4 per cent. among Europeans and Eurafricans, and 10 per cent. among natives. There were many cerebral cases. As the affected districts lie some 200 miles from a railway-station, medical relief was carried by aeroplane.

W. F.

CALONNE (R.). La malaria dans le Haut-Ituri. Le danger des eaux de barrages. [**Malaria in the High Ituri.**—*Ann. Soc. Belge de Méd. Trop.* 1935. Dec. 31. Vol. 15. No. 4. pp. 501-520. With 1 map.

An instance of man-made malaria at an elevation 5,000 feet, resulting from the damming of streams for agricultural purposes.

The High Ituri is on the west side of Lake Albert, facing Uganda on the opposite shore. It is a mountainous plateau lying at an altitude of some 5,000 or 6,000 feet and situated almost on the equator. The warm season begins in May and ends in October. When the rains come in September and October, fires are necessary even during the day. From January to April, when it is very dry, the days are warm but tempered by cool winds, and the nights are so cold that freezing point may be reached. The soil is very fertile and there are numerous plantations, especially coffee plantations. The author's examination of native tribes has convinced him that this region is normally almost free from malaria. The coffee-factories need water for the fermentation and decortication of the berries, and for this purpose dams have been erected across some of the ravines which have been converted into lakes covered with vegetation and sheltered from the wind. The splenic index of the labourers living in the neighbourhood of these reservoirs is between 80 and 90 per cent., as compared with 1 or 2 per cent. in villages more than 3 kilometres distant from them. The ravines are harmless in their natural state, but they are dangerous when they are disturbed. For example, several were cleared and imperfectly drained for agricultural purposes by a religious mission, with the result that malaria broke out among the children in their school. Two anopheles have been found on the high plateau of Ituri, *A. gambiae* and *A. christyi*. Most of the cases examined by the author were infected with *P. falciparum*, but *P. vivax* and *P. malariae* were also seen.

[NEWSTEAD and CARTER first described *A. christyi* under the name *Neocellia* ? *christyi*, n. sp. from a single specimen (♀) taken in Uganda by Dr. C. CHRISTY. They wrote that it was a very striking species, but that they could not, from the single specimen, be quite certain whether it was correctly placed in the genus *Neocellia*. (NEWSTEAD

and CARTER. *Ann. Trop. Med. & Parasit.* 1911. Vol. 5. pp. 238-240.)

EVANS in her book on "Anophelines of Tropical and South Africa" (1927) described *Anopheles christyi* at p. 41, placing it in the group *Neomyzomyia* Christophers (1924), and giving its distribution as Uganda and Kenya Colony. Under *Habits* she noted that "adults were found commonly indoors in Nairobi." SYMES writing in 1930 on *A. christyi* in Kenya (*Kenya & E. African Med. Jl.*, 1930, Vol. 7, pp. 2-11) said that it appeared to be definitely attracted to cattle and that it occurred in dwellings occasionally, but in very small numbers. [This discrepancy may have seasonal explanation?] LEESON reported it from S. Rhodesia, but stated (*S. African Jl. Sci.*, 1927, Vol. 24, pp. 424-428) that its larvae were not taken in sufficient numbers for data to be recorded. SEYDEL (*Rev. Zool. Bot. Afr.*, 1929, Vol. 28, pp. 28-31) has reported it from the Kivu district and the volcanic region of the Virunga in the Belgian Congo.

It does not seem to have been definitely associated so far with malaria in Kenya, S. Rhodesia, or Uganda.] W. F.

WILSON (D. Bagster). **Rural Hyper-Endemic Malaria in Tanganyika Territory.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Apr. 8. Vol. 29. No. 6. pp. 583-618. With 10 figs. [25 refs.]

Malaria causes comparatively little illness in Africans living in a hyperendemic area.

This valuable study was made in two out-of-the-way villages, with a Bantu population, situated about 15 miles to the north-west of Tanga which is on the East African coast in the north of Tanganyika. It is an area of high endemicity and all babies are infected before they are 5 months old. The author concludes that, "while children suffer from malaria during the first 2 years of life, and a few die during the first few months, older children cannot be said so to suffer, and no evidence was obtained of any harmful effects from malaria during adult life."

Babies during the first month were fat, placid and in excellent condition with no parasites in their blood. A month or two later the picture was very different. The children were fretful, feverish and evidently ill and the haemoglobin had dropped from about 85 to 45 per cent. The spleen was enlarged as far as the umbilicus and there was a congestive condition of the lungs. The change was partly due to malaria and partly to grossly unsuitable food. This state persisted for a little more than 6 months, and then, except for the few cases which ended fatally, improvement began. The time of first infection with parasites was generally the second month, all the babies were infected by the fifth.

During the period of acute infestation, which lasts about 18 months, the average number of parasites was 7,800 per cmm., and counts of 20,000 were often met with. The number of parasites and the size of the enlarged spleen remained about the same for the first two years, but there was very little danger to life after the first 6 months, and the degree of anaemia became less before the parasites began to decrease in number. Gametocytes began to appear when the children were 6 to 12 months old, and reached their maximum at the end of the second year. "Infectivity becomes a characteristic of these children neither when they are immune, nor before they have acquired their

immunity, but when they are in process of the change-over to the immune state." Gametocytes were seldom seen in adults. During the third, fourth and fifth years, the children played and ran about as though nothing was the matter with them. They were all infected, but the concentration of parasites in the blood ("parasite infestation") was lower and very irregular; counts were sometimes as low as 50 per cmm., and sometimes as high as 10,000. During this period the spleen became smaller. The spleen rate between 2 and 10 years was 85 per cent.; in adults it was 39 per cent. The infestation rate at the age of 5 was rarely above 1,500 per cmm., and thereafter it declined constantly until about the fourteenth year, when it reached 177 per cmm. The parasite rate fell to 68 per cent. at the tenth year, and to 45 in adult life. The author is of opinion that "inherited tolerance plays little part in the ultimate acquisition of immunity, for nearly all babies... suffered from intense infections.... Such inherited characteristics as do play any part in the immune process are rather of the nature of a power to acquire immunity."

P. falciparum was the dominant infection at all ages, but the other species (including *P. ovale*) were also present during the first few years of life, and more rarely later. The immunity acquired to *P. falciparum* was less complete than that acquired to other species. The general result of mosquito dissections was a gland infection of 12.2 per cent. but, just after the rains, this figure was much higher and the number of mosquitoes in the houses was greater. This increase of infectivity was followed, not preceded by, a higher average parasite count (infestation rate) in the population, and 3 months after the rains the gametocyte rate in children was double what it was before. W. F.

SCHWETZ (J.). Observations et recherches sur le paludisme dans le Congo belge. Note sur les groupes d'âge qui sont le plus gravement frappés par le paludisme dans les régions hyperendémiques de l'Afrique centrale. [**Malaria in the Belgian Congo and Drug Prophylaxis.**—*Riv. di Malarologia*. Sez. I. 1936. Vol. 15. Nos. 1 & 2. pp. 60-75; 146-152. With 3 charts. [24 refs.]

Immunity develops with age. The difficulties of drug prophylaxis. The author's earlier conclusions are confirmed by further research. *P. falciparum* is the commonest parasite. All the small children have many parasites in their blood, but, in adults, parasites can be found only in thick films. Fifty per cent. of the babies have crescents, but these are not found in adults. Quartan parasites are fairly common in infants, but they are rare after 10 years of age. *P. vivax* is also found in infants, but it disappears even earlier than *P. malariae*, and is rare after the third year.

The author has learnt from experience that drug prophylaxis is far more difficult to accomplish than is realized by those who have never practised among ignorant natives in the tropics. "The regular administration of drugs can be carried out only under the direct and permanent supervision of a European, and, moreover, a European who is alive to the importance of the work." His own experiments were carried out among school children.

He found that the results with 0.5 gram ($7\frac{1}{2}$ grains) of *Cinchona febrifuge* Roche were rather better than those with 0.25 gram of quinine

hydrochloride, and the cost less. When these doses were given daily over long periods, it was possible to reduce the parasite rate from 80 per cent. to about 20 per cent., but not lower. W. F.

MATTLET (G.) Le kapfura ou kafindo-findo. [**Kapfuro or Kafindo-Findo.**].—*Ann. Soc. Belge de Méd. Trop.* 1935. Dec. 31. Vol. 15. No. 4. pp. 521–525.

This is really malaria.

When Tabora was occupied by the Belgians in 1917, there was an outbreak of cerebrospinal meningitis among the troops which, the white Fathers of the Mission maintained, was really a native disease known as Kafindo-findo. This disease, the Fathers said, was characterized by a membrane which formed at the base of the tongue ; in severe cases there ensued high fever, cerebral symptoms and sometimes death from suffocation. It could be cured by scratching the back of the tongue with a pointed stick, and the Reverend Fathers scratched and cured the natives in hundreds wherever the disease was rife among them. The author sought for many years to find typical cases of the disease. It is called Kapfura in Urundi. He was shown cases of rhinopharyngitis among missionaries who had been smoking strong native tobacco, and cases of pharyngeal catarrh from other causes. Eventually he heard of some cases at Ruhengeri, north-west of Ruanda, in marshy country full of streams and rushes, at an elevation of 6,000 feet. These cases had fever and they had also numerous subtertian parasites in their blood. The same was found in all the severe cases of Kapfura, and quinine has now removed the dread of this disease from the missions. The author thinks that malaria was introduced into the highlands by the troops passing through it during the war, but Europeans are unwilling to admit that it is really malaria, because they affirm that there is no malaria, on the plateau, and they sleep without mosquito nets to prove it. W. F.

RUSSELL (Paul F.). **Epidemiology of Malaria in the Philippines.**—*Amer. J. Public Health.* 1936. Jan. Vol. 26. No. 1. pp. 1–7. [24 refs.]

Malaria control is impracticable in many rural areas in the tropics, because it is too expensive.

Malaria is responsible for ten to twenty thousand deaths annually in a population of 13,000,000. There are probably about 2,000,000 cases a year. It does not occur in the large cities. About 60 per cent. of the infections are benign tertian, blackwater fever is very rare and malaria is not such a serious menace as it is in British or Dutch Malaya. Barber found a parasite index of 11 per cent. and a spleen index of 13·3 as the result of examinations made in 14 provinces.

The malaria mortality rates have fallen greatly in the last 30 years ; the rates were : in 1905, 662 per 100,000 ; in 1925, 218 ; in 1932, 77. There is no evidence that larval control, quinine consumption, or the use of bed-nets has been responsible to any extent for this improvement. Probably changed diagnosis has been a factor.

Two anopheles have been incriminated as vectors : *A. minimus* var. *flavivirostris* and *A. maculatus*. The latter is zoophilous and rarely spreads malaria in the Philippines. *A. minimus*, the carrier, feeds with equal avidity on man and buffaloes ; it enters houses at night, but

is seldom found there in the day. Its effective range is rarely over one kilometre. It breeds in small clear streams and flowing irrigation ditches ; more often in shady than in open places. It is never found in rice fields, or above 2,000 feet altitude. Malaria is chiefly prevalent in the foothills where small streams offer breeding places suitable for this mosquito.

Paris green seems most suitable for combating malaria in the Philippines, and it has been used with success in army centres and on estates. Gambusia have been of no value at all. There is hope that malaria may be controlled, in those communities which can afford it, by the use of Paris green, but there are many districts in the Philippines which are too poor for this. "The longer one observes malaria in the tropics the more one is forced to conclude that, so far as average rural areas are concerned, the problem of control is still unsolved. Malaria prevention in the tropics by means of drains and subsoil pipes, larvicidal oil, and Paris green is entirely feasible . . . in cities, organized industrial and agricultural centers . . . ; but for most malarious rural areas in the tropics it appears that we have no economically feasible control methods . . . So far as I know, the drugs quinine, plasmochin and atabrine have never eradicated malaria from an area or even from a single town."

W. F.

FARINAUD (M. E.). La lutte contre le paludisme dans les colonies françaises. [**Malaria and Antimalarial Measures in the French Colonies.**—*Ann. de Méd. et de Pharm. Colon.* 1935. Oct.–Nov.–Dec. Vol. 33. No. 4. pp. 919–969.]

The author surveys, in the first part of this paper, the conditions as regards malaria in the different French colonies and mandated territories ; in the second part, he discusses the methods adopted for its prevention. He considers it waste of time to begin with propaganda when dealing with backward races. First heal the sick, next protect the healthy, then educate. Prophylactic quinine has been taken for years in Africa, it prevents serious illness and death, although it does not prevent malaria. For individuals it is useful, but for collections of labour under ordinary conditions it is of little value ; for example, in the agricultural colony of Fri-Cu in Tonking, 30 per cent. of the children had parasites in their blood at the end of a year's prophylactic treatment. The results with plasmoquine and atabrin have been rather more promising ; in the case of benign tertian, prophylaxis with these drugs may merely render the infection latent, but in subtertian, as JAMES has shown, if the attack does not occur within the usual incubation period it means that the infection has been aborted. Unfortunately atabrin accumulates in the body and therefore it cannot be used with safety in small daily doses over a long period. Drug prophylaxis depends for its success not only on constant and close supervision, but also the community under treatment must be isolated, stable and under strict control ; every carrier must be treated. Even where mass prophylaxis has been successful, malaria quickly returns to its former level when the drugs are withdrawn. The best results appear to have been obtained with atabrin, and the author thinks it possible that rhodoquine and quinacrine the French forms of plasmoquine and atabrin may be used in the French colonies instead of quinine. At present between 7 and 8 tons of quinine are used annually in French possessions at a cost of more than 3 million francs a year.

W. F.

FRÉVILLE (L. H.) & NGUYEN-VAN-LUONG. Quelques nouveaux cas de contaminations paludéennes au cours de pèlerinages au mont Baden (Tay Ninh).—*Bull. Soc. Méd.-Chirurg. Indochine*. 1935. June. Vol. 13. No. 5. pp. 562-569.

MICKANIEWSKI & HAI. Enquête sur le paludisme dans la province de Baria.—*Bull. Soc. Méd.-Chirurg. Indochine*. 1935. June. Vol. 13. No. 5. pp. 543-557.

RISTORCELLI. Note sur le paludisme dans la région de Tatahouine.—*Tunisie Méd.* 1936. Mar. Vol. 30. No. 3. pp. 119-122. With 3 figs.

UNION OF SOUTH AFRICA. ANNUAL REPORT OF THE DEPARTMENT OF PUBLIC HEALTH FOR YEAR ENDED 30TH JUNE, 1935 [THORNTON (E. N.), Secretary]. [**Malaria.**—**A. Control in Natal and Zululand. B. Tzaneen Field Station. C. Railway Areas** pp. 29-32. **Malaria** pp. 82-85.]

"We have been driven to employ hut-spraying during the malaria season as our main weapon over extensive sections of the country, and after a two-years' trial on the large scale are satisfied that the disease can be controlled by it in Natal and Zululand. It is essential, however, that (a) hut-spraying commence as soon as adult *gambia* or *funestus* begin to enter dwellings; (b) it be applied to every habitation over the area to be dealt with, and that such area be as large as possible; (c) every dwelling be thoroughly sprayed at least once weekly, but preferably bi-weekly . . . our method can only be successful when the vectors are in the habit of frequenting houses. Reduction in the infectivity rate may be very marked." It was below 1 in 1,000 of anopheles gorged with human blood in native areas formerly affected by malaria. This work was begun in 1932-33 with a pyrethrum insecticide. Many natives who were formerly hostile have now become convinced that malaria is associated with anopheles and they have begun to limit mosquito breeding by draining and restricted oiling. The author does not advise that complete reliance should be placed on insecticides alone in those closely settled communities where antilarval measures can be carried out; but, over a large part of the country, and particularly in native reserves, antilarval measures are quite impracticable. The Railway Department put in 4,762 yards of subsoil drains and 13,000 yards of earth drains during 1934-35. During the winter dry season, arrangements were made to treat all relapse cases occurring in the native reserves. Municipalities and boroughs depended mainly on larval control supplemented in every case by spraying of dwellings with insecticides. On the coast north of Umfolosi, which is a highly malarious area, in accordance with Professor Swellengrebel's advice, no organized control measures were attempted lest they should tend to destroy the degree of natural immunity attained by the native population. Here there was no improvement in the malaria position during 1934-35, but elsewhere, "the results of measures taken are so striking that provided they are kept up we can count on a practical elimination of the disease in the country south of the Umhlatuzi River, in Zululand, and in the controlled area to the north of that river." In the coastal area, malarial incidence was much less than in previous seasons though there was little reduction in the numbers of *A. gambiae*.

Seepage areas are dealt with in some areas by planting trees to promote drying and absorption, natives have been induced to plant gum trees (*E. saligna*) and the Native Affairs Department has set aside an annual sum for the establishment of plantations. Screening of dwellings and public buildings is widely used. Monel metal is used by the Railway Administration in Natal, and bronze gauze in the Transvaal. [The insecticide employed is "Pyagra" diluted 1 in 17 with paraffin. See this *Bulletin*, 1935, Vol. 32, p. 393.] W. F.

SCHARFF (J. W.). **Anti-malarial Drainage from the Point of View of the Health Officer. Parts I & II.**—*Malayan Med. Jl.* 1935. Dec. Vol. 10. No. 4. pp. 119-137. With 15 figs. & 1 diagram.

"A practical knowledge of drainage technique is as necessary for malaria field-workers as is the study of mosquito ecology." This knowledge is not easy to come by, and, in this series of papers which deals with the theory and practice of anti-malaria drainage, the author has done great service to his fellow-workers in malarious countries. He emphasizes the need for proper control of general anti-mosquito and anti-malaria measures. It has happened far too often, he writes, that spasmodic efforts on the part of local authorities, while leading in some cases to partial success, fail in the end for lack of continuity, and bring discredit upon measures which would command success if well carried out. He first considers the different types of soil, the size of their particles, the air-space between the particles, and the influence of these factors upon permeability. Next, he discusses water in its relation to soil particles, and the water-table in its relation to the formation of springs and seepages. Drainage removes the excess of water from the soil, and the water is replaced by air. Subsequently, each fall of rain refills the "pore" spaces in the soil with water which in its turn again gives place to air. This phenomenon is the aeration of the soil, so important to agriculturists. Without this process of aeration, the organisms which convert the oxygen and nitrogen of the pore-spaces to the use of the plants cease to work; the useful plants die and are replaced by weeds which are specially adapted to grow without soil-air. Drainage "sweetens" the soil, the farmer says; in some places it removes the excess of alkali; in others, it removes the excess of peaty acids. Drainage not only reduces the amount of malaria, but, at the same time, it enriches the land and the people. Filling is justified in places where, in addition to reclaiming a dangerous swamp, a great housing scheme is made possible; but only under exceptional circumstances should filling be debited to an anti-malarial budget. Apart from such large schemes, the author does not recommend filling in the Malay States. The material employed is often impervious; springs and seepages reappear on the top of the filling, and oozing water spreading over it continues to afford numerous breeding places for dangerous anopheles.

The second part of this paper deals with "The Principles and Objects of Land Drainage in Connection with Anti-Mosquito Projects." It begins with a description of the effect of drains upon the movement and level of the subsoil water. "Without water it is impossible to grow crops, but too much water may be as bad as too little. . . . Even wet rice cultivation forms no exception to this rule, and though such land must at certain seasons be flooded for the growth of a crop of rice, yet at other seasons surplus water must be removed in order to aerate the

soil. The reason for the inhibitory effect which this slowly alternating flooding and drying has on the breeding of malaria-carrying mosquitoes is not at present understood." The influence of geological features, such as the arrangement and permeability of the strata, on drainage is next discussed; this is followed by a consideration of practical drainage problems such as the drainage of ponds, lakes and swamps, and examples are given of different methods which have been employed with success in dealing with special cases. For example, dangerous anopheles were found breeding in the puddles formed by the drippings from stand-pipes in Penang, where the surface layer of the soil is impervious with a pervious stratum underneath. Drainage was successfully accomplished by sinking a shaft with the bore-hole auger used in latrine construction, through the impervious layer into the pervious stratum beneath. This article which is illustrated with numerous diagrams and sketches will be continued in a later number. *W. F.*

SCHARFF (J. W.). **On a Method of planting and growing Grass in Connection with Anti-Malarial Drainage Projects.**—*Malayan Med. Jl.* 1935. Dec. Vol. 10. No. 4. p. 153.

One of the difficulties in draining hill land is to maintain the drained surface undamaged under frequent falls of rain. In the Malay States, grass has been found the best protection. The efficiency of anti-malarial drainage frequently depends upon the quickness with which grass plants can be induced to take firm hold upon the soil. It is necessary to plant a creeping grass to provide the necessary stability. A method used in the Dindings is as follows: Thin sods of grass are cut about 2 feet square; they are rolled up like a jam-roll and chopped into small sections $1\frac{1}{2}$ to 2 inches square. These are thrown into a barrel half full of a mixture of cow-dung and water which has been allowed to mature for at least 2 days. The mixture should have the consistency of thick porridge. The surface which requires turfing is beaten down quite flat and is plastered with a layer of the mixture about $\frac{1}{4}$ an inch thick. On the following day it is watered, and, on the third day, blades of grass begin to appear. Avoid planting in stormy weather. Do not scythe the grass until 2 months later. *W. F.*

ROUCHÉ. Deux années de lutte contre les moustiques au centre d'aviation de Rochefort. [**Two Years' Antimosquito Work at the Rochefort Aviation Centre.**]—*Arch. Méd. et Pharm. Nav.* 1935. Oct.-Nov.-Dec. Vol. 125. No. 4. pp. 545-582. With 26 figs., 1 folding map & 2 plans.

Prevention of mosquito-nuisance by ordinary methods carried out with enthusiasm and success. Waste oil from the aeroplanes is used.

The naval aviation centre and school for army air mechanics is situated outside the town of Rochefort in a loop of the river Charente not far from its mouth. It is surrounded by flat, marshy land. The new buildings required in connexion with the aerodrome and school have interfered with the natural drainage which is difficult in any case owing to the flat, low-lying land. The breeding places of the mosquitoes are largely man-made; for instance, a large stagnant pond in connexion with the electric light works. An enormous amount of culicine breeding takes place in sewage from water closets, latrines and septic tanks. Mosquitoes have been so numerous as to prevent sleep

at night. In days gone by, malaria was a serious disease in Rochefort and there are still a few cases every year. There were 22 cases between 1924 and 1928. They were all due to *P. vivax*. The author observed two cases in 1934. *A. maculipennis* var. *atroparvus* is found in the buildings; they do not breed in the government aerodrome area, but in neighbouring farms situated in the marshes outside the camp. A great deal has evidently been accomplished in the way of filling up pools and cleaning up streams and drains.

Screening is provided in some of the barracks, and the dormitories are sprayed with insecticide. An almost unlimited supply of waste oil from the aeroplanes is available for spraying, and this is used in drip-tanks and sprayers. The results have been excellent, and in some places where mosquitoes were present in hundreds, there are now none. In the ditches of the farms, just outside the camp, anopheles continue to breed.

W. F.

SAUTET (Jacques). Cinq années de lutte antipaludique dans le nord de la Corse. [**Five Years' Antimalaria Work in North Corsica.**]—*Rev. Méd. et Hyg. Trop.* 1936. Jan.-Feb. Vol. 28. No. 1. pp. 23-30.

The anti-malaria service was inaugurated in 1930. The author was the Director of the work in the northern half of the island with headquarters at Bastia, and about 20 dispensaries scattered over the country. Mobile units visited the dispensaries, sought out the infected people, examined and card-indexed them and prescribed the treatment to be carried out locally with quinacrine or quinine, and rhodoquine. In rural districts, *Gambusia* were introduced into breeding places; in populous centres, Paris green was employed. Supervisors on motor-bicycles covered large areas inspecting the work carried out by the labourers. The results were good during the first two years, but they were less good in 1934 and 1935 owing to an influx of Italians and other foreigners for employment on public works, and also because antilarval work had been suspended owing to lack of funds.

W. F.

BALFOUR (M. C.). **Some Features of Malaria in Greece and Experience with its Control.**—*Riv. di Malariologia*. Sez. I. 1936. Vol. 15. No. 2. pp. 114-131.

Drainage better than drugs. Fewer relapses after atebtrin than after quinine, but fewer relapses after atebtrin plus plasmoquine than after atebtrin alone.

Observations on malaria in Greece have been made, since 1930, in five principal "field study areas" which have been established in Attica, the Peloponnesus, Central Greece, Macedonia and Thrace. An important point which has been established is that natural fluctuations occur in malaria which varies from a mild endemic to a severe epidemic form. Meteorological conditions have the greatest influence in determining the situation. "The winter rains, and the snow which falls on the mountains, are the foundation upon which the following malaria season develops. . . . When a wet spring is superimposed on a wet winter . . . a bad malaria season will probably follow." A.

elutus is the most important vector, *A. superpictus* is also a dangerous carrier; *A. maculipennis* is very numerous, but much less important. The average rates of infection with sporozoites during the 3 years were: *A. elutus* 1.29 per cent.; *A. superpictus* 0.84 per cent.; *A. maculipennis*, 0.07 per cent. The first two fly for long distances, up to 5 kilometres, and, at some places in central Greece it has been necessary to extend antilarval measures to a radius of $5\frac{1}{2}$ kilometres ($3\frac{1}{2}$ miles). New infections occur from the middle of May to the middle of October. In ordinary years, infections with each of the three types of parasite occur in equal proportion, but, in epidemic years, *P. falciparum* infections predominate. As regards the effects of malaria upon the population, in ordinary years, though the spleen index may be about 70 and the parasite rate about 30, there is very little illness, but in epidemic years every one suffers. "It is now recognized in Greece that quinine is a therapeutic and not a preventive measure. The use of quinine has been, and will continue for years to be, the backbone of relief for the majority of malarious communities." Comparative tests were made with quinine, atabrin, and plasmoquine 0.02 gram plus atabrin. The relapse rates were 45 per cent., 30 per cent. and 8 per cent. respectively. The author is of opinion that 10 days is the optimum duration of quinine treatment; five days he considers too short. "The malaria worker soon arrives at the conclusion that in Greece, as elsewhere, drainage operations, large and small, are the basis of permanent antimalaria efforts. . . . In the Struma Valley . . . a drainage project, costing about \$20,000,000, is also nearing completion." Drainage supplements and gradually takes the place of Paris green.

W. F.

RICE (E. Milford). **Observations on Malaria in Assam, with Special Reference to Cold Weather and Pre-Monsoon Anti-Larval Control.**—*Records of the Malaria Survey of India*. 1935. Dec. Vol. 5. No. 4. pp. 371-388. With 4 graphs. [16 refs.]

Anti-larval measures in Assam should be carried out during the first half of the year instead of from March to November.

The period at present generally advocated for the application of anti-larval control is from March 15 to November 15. *A. minimus*, the only carrier, breeds in clear running water. On many estates the breeding area is limited to one or two small streams, and the breeding time is limited to the period January to June. When the monsoon breaks in June, these streams are flushed out with muddy water and breeding ceases. On some estates, breeding proceeds in the same way until the beginning of the monsoon, but, instead of coming to an end, it continues in monsoon streams, drains and other suitable places, with the result that the malaria season continues for a longer period. The author concludes that the breeding of *A. minimus* from early January to mid-June is the principal factor responsible for the incidence of malaria and that transmission in the cold weather is the cause of the April rise; he suggests that anti-larval measures applied during this period would be more economical and efficient than those applied in accordance with present practice from mid-March to mid-November. Estates with no breeding places in their area have no malaria, though breeding may be taking place at a distance of a half to two miles. The usual flight distance of *A. minimus* is therefore not more than half a mile. W. F.

RICE (E. Milford). Anti-Larval Oil Application by a "One Man" Brushing Method.—*Records of the Malaria Survey of India*. 1935. Dec. Vol. 5. No. 4. pp. 499–500. With 2 figs. on 1 plate.

This is a modification of Quaife's brush method of oiling. The author attaches a bamboo brush to the nozzle of a Knapsack Solo Sprayer by means of two motor-car hose-pipe connexion fittings. The two operations, the application of the oil and its distribution with the brush, can therefore be carried out by one cooly instead of two. *W. F.*

WHITE (R. Senior). Malaria Control by Subsoil Drainage at Waltair.—*Records of the Malaria Survey of India*. 1936. Mar. Vol. 6. No. 1. pp. 13–18. With 5 figs. & 1 diagram on 2 plates.

Peasants object to Paris green on their paddy-fields.

For some years, earth drains and oiling were employed. Early in 1932 the conversion of the open drains into subsoil drains was begun. The drains were deepened to 3 feet, flat-sided stones were laid to form a tunnel over which smaller stones were placed, gradually decreasing in size towards the top. The whole was topped off with earth in which grass was planted. The subsoil drainage proved more efficient and was less costly than the open drains and oiling. On one side of the town there were 30 acres of paddy which was regularly dusted with Paris green. The peasants strongly objected to this, and, after the dusting had been going on for a year, they refused to let it continue. The land was eventually bought by a speculator for building purposes. *W. F.*

EJÉRCITO (Antonio). Malaria and its Control in the Philippines.—*Monthly Bull. Bureau of Health*. Manila. 1935. Aug. Vol. 15. No. 8. pp. 253–258.

Systematic larval control was begun in 1926, and Paris green was employed as a larvicide over an area with a radius of 1.5 kilometres (nearly a mile) around the communities to be protected. In some localities the results were good, but in others they were a failure, and it is suggested that the radius controlled was not extensive enough to prevent anopheles reaching the dwellings at the centre. After six years of Paris green control, this method has been abandoned except in certain places where money is available; elsewhere, reliance is placed on the use of mosquito nets and the treatment of the sick. *W. F.*

WALCH (E. W.) & SOESILO (R.). Malaria Control in the Netherlands Indies.—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1935. Vol. 24. No. 3. pp. 86–94. With 15 figs. (11 on 6 plates).

This paper was published in the Transactions of the 9th Congress of the Far Eastern Association of Tropical Medicine and Hygiene, and is summarized in this *Bulletin*, 1935, Vol. 32, pp. 728–29. The paper under review contains some good photographs and a picture of *Puntius javanicus*, the fish which feeds on pond vegetation. This note is inserted because the Dutch Journal is easier to obtain for reference than the Transactions of the Far Eastern Association. *W. F.*

GOLDFEDER (A. E.). Malaria und Auge. 4. Mitteilung: Ueber ein allgemein zugängliches Augensympton der chronischen und larvierten Malaria. [*Malaria and the Eye.*—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. May. Vol. 40. No. 5. pp. 207-211. With 3 figs.

A new eye symptom is described by the author in latent and chronic malaria.

In the protozoological Institute of the Ukrain the melanoflocculation reaction of Henry has been employed in the diagnosis of malaria and the author considers it possible that with improvements the reaction may become as specific for malaria as the Wassermann reaction for syphilis. As another comparatively easy method of diagnosis of malaria the author describes an eye symptom which can be readily recognized by the general practitioner. He describes it as "a symptom of malarial eye blood vessels" It consists of the presence of peculiar and unusual blood vessels in the conjunctiva of the eyeball. He describes and illustrates the appearance in detail. The changes generally occur in one eye but sometimes both eyes are affected. He describes his method of demonstrating the appearances. He considers that this eye symptom, which he describes, is as pathognomonic for malaria as Hutchinson's teeth are for congenital syphilis.

The vessels are superficial and in fact appear as if raised above the surface of the ocular conjunctiva, they are generally of larger calibre than the other conjunctival vessels, and though they vary in depth of colour they are always darker than the other surface vessels. If the eye is directed straight forwards the vessels have a wavy outline (spiral or corkscrew shaped), if the eye is moved to the opposite side they are drawn out like strings [*i.e.*, straightened] (Fig. 1), they do not divide dichotomously like other conjunctival vessels, but as they approach the sclero-corneal junction either divide, each into two running parallel

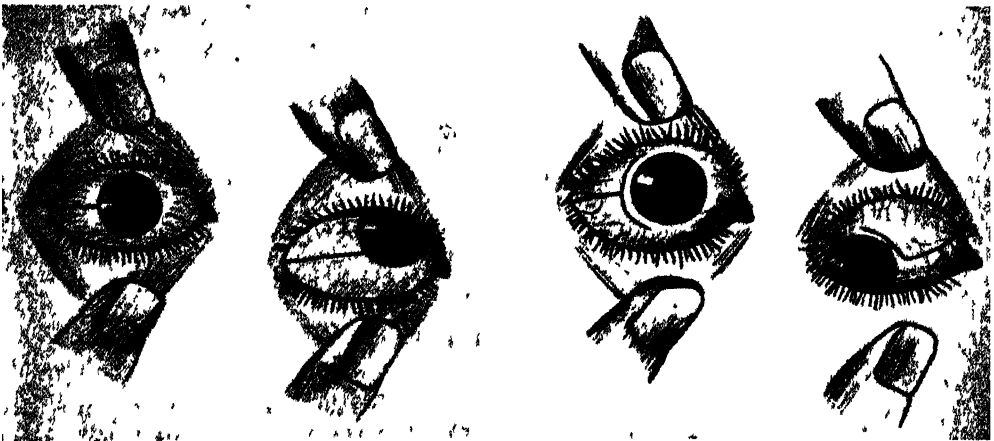


Fig. 1.

Fig. 2.

Unusual blood vessels in the conjunctiva of the eyeball, described by GOLDFEDER as pathognomonic for malaria.

[Reproduced from the *Archiv für Schiffs- und Tropen-Hygiene.*]

round the cornea, or, without dividing, turn sharply to run parallel with the corneal margin (Fig. 2) ; they do not anastomose with other vessels but are lost in the fornix of the conjunctiva.

To those specially interested the paper may be consulted in original and the figures therein studied.

E. D. W. Greig.

BHATTACHARJEE (N. C.). A Case of Malaria with Acute Mania.—*Indian Med. Gaz.* 1935. Dec. Vol. 70. No. 12. p. 686.

A patient with subtertian malaria became so violent that it needed four men to hold him in bed. He talked nonsense, kept his eyes tightly closed and resisted all attempts to open them ; his temperature was between 99·4°F. and 101°F. He improved rapidly on quinine and in about 24 hours the symptoms had disappeared.

W. F.

GROSSMAN (J.) & SOLOMON (Eug.). Quatre cas de syndrome appendiculaire d'origine paludéenne. [Four Cases with Symptoms of Appendicitis due to Malaria.]—*Bull. et. Mém. Soc. Méd. Hôpit. de Bucarest.* 1936. Jan. Vol. 18. No. 1. pp. 10-18.

The authors review former observations of this condition and relate the history of their four cases. The signs which put them on the track of a correct diagnosis are leucopenia in a case resembling appendicitis, together with a good general condition and a pulse corresponding with the temperature. The presence of parasites greatly strengthens the diagnosis, but does not rule out appendicitis entirely. The symptoms disappear under quinine if they are due to malaria.

W. F.

See also p. 369, YENIKOMSHIAN, **Septicaemic Plague simulating Malaria.**

THOMAS (W. L.) & KEYS (S.). Accidental Transmission of Malaria by Blood Transfusion. With a Note by S. C. DYKE.—*Lancet.* 1936. Mar. 7. pp. 536-537. [12 refs.]

Transfusion with citrated blood by means of a three-way syringe was performed on August 24th and September 9th, 1935. Eighteen ounces of blood were inoculated on the first occasion and ten on the second. On September 12th, the recipient developed a high intermittent fever with rigors. On September 19th, the blood was examined for malaria parasites and *P. vivax* was found. The donor had served as a soldier in India from 1927 to November 1933. No parasites were found in his blood and he had never, so far as he knew, suffered from malaria, but in June 1934, he had had a short series of shivering attacks each lasting 2 or 3 days.

W. F.

DAY (L. F.). Quinine and Otosclerosis.—*Malayan Med. Jl.* 1936. Mar. Vol. 11. No. 1. pp. 53-54.

The author describes 3 cases of otosclerosis which began with progressive deafness and tinnitus following a course of quinine treatment. Two of the patients were schoolmasters, one 28 and the other 25 years old, who could not hear a speaking voice more than 3 or 4 feet away. The third patient was a Chinese shopkeeper aged 45. It is suggested that the deafness was due to the effects of the hyperaemia produced by large doses of quinine. This causes absorption of circumscribed areas

of bone around the labyrinth, which are later replaced by new spongy bone. When once the bony changes of otosclerosis have begun, they progress. Eventually the stapes becomes ankylosed to the oval window and the bony changes spread to the cochlear region; degeneration of the auditory nerve follows.

W. F.

DANG (Mi-Gieu), HEMENWAY (Ruth V.) & LAU (Stephen). Report of Nine Hundred and Sixty Cases of Malaria in Mintsing, Fukien.—*Chinese Med. Jl.* 1935. Nov. Vol. 49. No. 11. pp. 1235–1240.

YUI (E. M.) & PATY (R. M.), Jr. A Review of 203 Malaria Cases.—*Chinese Med. Jl.* 1935. Nov. Vol. 49. No. 11. pp. 1228–1234.

SICAULT (H.) & NESSLERLIN (H.). Observations de quelques cas de néphrite quartane avec syndrome de rétention chlorurée.—*Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 268–274. [16 refs.]

ZIMINE (E.). Un cas de pleurésie hémorragique d'origine paludéenne.—*Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 267–268.

RANKOV (M.). Die Verteilung des *Plasmodium vivax* und *Plasmodium immaculatum* bei verschiedenen Altersgruppen. [**Distribution of *Plasmodium vivax* and *immaculatum* in Different Age Periods.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. July. Vol. 40. No. 7. pp. 277–289. With 14 figs.

The author made his observations in southern Yugoslavia in 1924. He examined in all 442 cases of which 44 per cent. were benign and 56 per cent. malignant tertian malaria. He studied the distribution of the infections in the various age periods and his paper is illustrated with diagrams and tables.

He concludes that the percentage distribution of benign and malignant infections in the age groups in southern Yugoslavia is markedly different. There is a quite regular fall in the percentage of benign tertian with increasing age and a corresponding increase of malignant tertian. He thinks the explanation of this phenomenon lies in the different speed and degree of development of the resistance of the organism.

E. D. W. Greig.

PANDIT (S. R.). **The Morphology of Malarial Parasites.**—*Records of the Malaria Survey of India.* 1935. Dec. Vol. 5. No. 4. pp. 389–392. With 63 coloured figs. on 2 plates.

Thin films were exposed to the vapour of osmic acid, while they were still wet, by inverting the slide over the open mouth of a bottle containing a 2 per cent. solution of osmium tetroxide in 1 per cent. chromic acid. The films were fixed in methyl alcohol and stained with Giemsa. Coloured plates are given in which such preparations are compared with ordinary air-dried films. "It is suggested that fixation of wet films over the vapour of osmic acid gives a truer picture of the parasites."

W. F.

IVANIĆ (Momčilo). Ein neuer Beweis für den ursprünglich promitotischen Charakter der Kernteilung beim Tertianaparasiten (*Plasmodium vivax* Grassi et Feletti). [**Fresh Proof of the Primitive Promitotic Character of Nuclear Division in *Plasmodium vivax*.**]—*Zent. f. Bakt.* I. Abt. Orig. 1936. Feb. 13. Vol. 136. No. 1/2. pp. 109–111. With 1 fig.

The title describes the nature of this communication. The author obtained his material for investigation from a 10-year-old-boy who was very heavily infected with benign tertian malaria. The blood films were stained by Giemsa's solution; [method of fixation is not mentioned].

He concludes that the nuclear division occurring during the schizogony phase of the *Plasmodium vivax* is promitotic in character and, probably, this character is common in this parasite. From this he holds that a new support has been found for the view that the malaria parasite arises from a lower rhizopod which regularly divides by promitosis, hence it appears that malaria infection originally took place by oral ingestion, which makes the mosquito theory questionable.

E. D. W. Greig.

IVANIĆ (Momčilo). Ein neuer Beitrag zur Kenntnis der Kernteilung beim Tertianaparasiten (*Plasmodium vivax* Grassi et Feletti). [**Nuclear Division in *Plasmodium vivax*.**]—*Zent. f. Bakt.* I. Abt. Orig. 1936. June 12. Vol. 136. No. 7/8. pp. 418–420. With 2 figs.

A study of nuclear division in *Plasmodium vivax*.

The author refers to his previous communication dealing with this subject and the present paper is a continuation of the investigation. Two mitotic nuclear division stages of *Plasmodium vivax*, one early the other late, are described. He states that he again produces proof that the original promitosis of *Plasmodium vivax* changes into a true mitosis.

E. D. W. Greig.

LINTWARÉFF (J. J.). Beiträge zum Studium der Malaria-pathogenese. [**Study of the Pathogenesis of Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Feb. Vol. 40. No. 2. pp. 63–73.

A study of the part played by haemoglobin in the pathogenesis of malaria.

The author refers to his work on the significance of haemoglobin in pathology. He considers that the toxin formed by the malaria parasite is adsorbed by haemoglobin of the red cells, and passes into the blood plasma. The haemoglobin combined with the malaria antigen circulating in the blood stream causes a hyperplasia of the reticulo-endothelial tissue, especially that in the lungs and mesentery, whereby the antigen in this tissue becomes transformed into malarial antibodies. He suggests that this hyperplasia and hyperfunction of the reticulo-endothelial tissue explains the beneficial effect of malariatherapy in metaluetic diseases, the RE tissue produces not only anti-malarial but also anti-syphilitic bodies. The haemoglobin-toxin is taken up by the cells of the renal tubules causing cloudy swelling (nephrosis); the iron from the disintegrated haemoglobin gives a beautiful Berlin blue reaction in the renal cortex. The haemoglobin-toxin also attacks the intima of the blood vessels in the mucous membrane of the intestinal canal producing thrombosis of the small vessels, resulting in necrotic lesions in the large and small intestines. By the action of the toxin on the walls of the small veins leakage occurs, resulting in numerous

extravasations in the pleura, peritoneum, epicardium and brain; these are usually minute, but at times larger haematomas take place.

E. D. W. Greig.

JACOBSTHAL (E.). Die Infektion der Reticulocyten durch Malaria-plasmodien. [**Infection of Reticulocytes with Malaria Parasites.**]—*Klin. Woch.* 1936. June 27. Vol. 15. No. 26. p. 942.

Description of simple stain for reticulocytes and of the results obtained with it in malarial infections.

The author's stain is a modification of the Hirschfeld method. The procedure, which is very simple and easily applicable in practice, is as follows:—Blood films are stained with Loeffler blue (2–3 minutes), at the end of this time they are well washed in water, then stained 5–15 minutes in ordinary dilution of Giemsa. Washed in distilled water and dried in air. Fixation after Loeffler with saturated watery solution of perchloride of mercury may be employed; although finer results are obtained with unfixed films, the latter are not so good for permanent preparations as the fixed films.

Employing the above technique the author found that in infections with *Plasmodium vivax* and *falciparum* the parasites selected the young red cells; 90 to 98 per cent. of infected cells were reticulocytes. This he considers of considerable clinical importance as a number of these young red cells are destroyed and so anaemia is produced. He also noticed that the reticular structure of infected reticulocytes was altered. He stresses the point that to get good results the films must be fresh.

E. D. W. Greig.

SARKISSIANE (A. B.). La moucheture de Schüffner et le ponctuage de Maurer dans les erythrocytes dans les cas de leur coloriage par le nilblausulfate-azur-éozine.—*Folia Haematologica*. 1936. Feb. Vol. 54. No. 2/3. pp. 145–149. With 2 figs.

SICÉ (A.) & ROBIN (Ch.). A propos du *Plasmodium falciparum* et de ses formes atypiques.—*Marseille-Méd.* 1936. Feb. 5. Vol. 73. No. 4. pp. 137–139.

BOYD (Mark F.), STRATMAN-THOMAS (W. K.) & MUENCH (Hugo). **The Occurrence of Gametocytes of *Plasmodium vivax* during the Primary Attack.**—*Amer. Jl. Trop. Med.* 1936. Mar. Vol. 16. No. 2. pp. 133–138.

“A tertian malaria patient with an attack of average duration or better is almost certain to be highly infectious for anophelines at some time during his attack.”

Gametocytes were invariably found at some time during the disease when its duration exceeded 16 days. Parasites rarely appeared earlier than the 10th day after inoculation by mosquitoes. Gametocytes were seen occasionally on the first occasion that the blood was positive, but never earlier than the 14th day after inoculation. Subsequently, gametocytes were produced in showers which occurred at regular 5-day intervals, on the 19th, 24th, 29th, 34th and 44th days. None was observed on the 39th day.

W. F.

DE ALDA CALLEJA (M.). Estado actual de los estudios sobre suero-floculación en el paludismo. (Reacción de Henry.) [**Present Views on Henry's Reaction in Malaria.**—*Medicina Paises Calidos*. Madrid. 1936. May. Vol. 9. No. 5. pp. 203-236. With 5 figs. [104 refs.]

The author describes Henry's original reaction and subsequent modifications of it, the technique of its performance, sources of error, interpretation of results, records of previous investigators, and the value of the reaction in clinical practice, diagnostically, prognostically and as evaluating the results of treatment.

He sums up the present position as follows :—

1. Henry's reaction is a valuable aid in diagnosis of malaria, provided the deviser's instructions are followed.

2. It is of service in gauging the progress in the course of treatment, if a series of curves be plotted, and these curves are also useful in indicating relapse.

3. In the invasion stage, after accessions of fever, the reaction is positive in 100 per cent. ; in chronic malaria, results recorded have been varying, but with a high percentage positive.

4. The modified reaction is simple and consequently of use in clinics and in epidemiological studies.

5. The pH has but little influence on the reaction.

6. The proportion of non-malaria patients, such as syphilitic, tuberculous and leukaemic, reacting is small, but a positive result is sometimes obtained in protozoal infections, such as kala azar.

There is an extensive bibliography.

H. H. S.

GNOCHVILI (I.), KEIGUELOUKHES (I.) & MOURGIRI (M.). La réaction Henry dans le diagnostic du paludisme. [**Henry's Reaction in Diagnosis of Malaria.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1935. Vol. 4. No. 6. [In Russian pp. 458-461. French summary p. 461.]

The authors carried out the melanoflocculation test on patients at the Institute of Tropical Medicine of Georgia. They tested 259 cases of malaria, 225 with other diseases and 27 healthy subjects. The reaction was positive in 95 per cent. of the first group, in 10.6 per cent. of the second, but was negative in all those in health.

H. H. S.

WERNER (H.). Ueber die serologische Vervollkommnung der Malaria-diagnose. Seroflokkulation.—*Deut. Med. Woch.* 1936. Feb. 28. Vol. 62. No. 9. pp. 347-350. [11 refs.]

PRUDHOMME (R. O.). Flocculation des sérums dans l'eau distillée et réaction de Henry. [**The Flocculation of Serums in Distilled Water and Henry's Reaction.**—*C. R. Soc. Biol.* 1935. Vol. 120. No. 38. pp. 944-946.

The substance which is flocculated by Henry's melanine is the same as the substance flocculated by distilled water in "surflocculance." It is present in all serums, but is increased in malaria.

In Henry's reaction : to the serum, diluted 1 in 5 with distilled water, melanine is added to the first tube and formol to the second which serves as the control. In a "surflocculant" serum, flocculation occurs in the distilled water control. If, in such a serum, one separates, by centrifuging, the floccules appearing in the distilled water tube, redissolves them in the same quantity of normal saline and then applies

Henry's reaction, the result is positive. If the supernatant fluid from the centrifuge be tested, it is found to be no longer positive. If a serum be examined which gives a precipitate in the melanine, but not in the distilled water control tube, it will be found that flocculation will occur in the latter when more distilled water is added; say, to 1 in 10, instead of 1 in 5. If this precipitate be centrifuged off and dissolved in saline to a dilution corresponding to the original 1 in 5, it will give a positive Henry's reaction. With normal sera, negative to Henry's reaction, flocculation will not occur when one dilutes with distilled water up to 1 in 10, or so, but if one dilutes up to 1 in 40, or more, flocculation appears. If this substance, precipitated from normal serum by distilled water, be centrifuged off and redissolved in a small quantity of salt solution, this solution will give a positive result with Henry's melanine. The author concludes that a malarial serum differs from a normal serum only by reason of its greater content of a substance which is precipitable by distilled water. When this substance is present in great quantity, the serum is "surflocculant"; i.e., flocculation occurs in 1 in 5 of distilled water. When it is present in smaller quantity, flocculation is rendered macroscopically evident, at this dilution, only in the presence of an indicator such as carmine or Henry's melanine. This substance is normally present in all sera, and it is not surprising to find all grades between a normal serum, in which precipitation occurs only when a large quantity of distilled water is added, and a malarial serum in which precipitation occurs on the addition of very little.

W. F.

TRENSZ (F.). Sur les différences d'activité que présentent la mélanine, l'eau distillée et différents indicateurs, dans la réaction de Henry. [**Differences in Activity displayed by Melanin, Distilled Water and Various Indicators in Henry's Reaction.**]*—C. R. Soc. Biol.* 1936. Vol. 122. No. 21. pp. 666-668.

In a previous communication the author adduced evidence showing that in Henry's reaction the melanin unites with a fraction of euglobulin to form a flocculating compound. He now shows that this melanin-euglobulin flocculum, unlike the flocculum produced by distilled water or 0.3 per cent. NaCl solution, is insoluble in 0.9 per cent. NaCl solution. Melanin is not an inert substance as are certain coloured pH indicators, for example, which disclose the existence of a state of things without influencing it. Melanin, on the contrary, intervenes actively in certain conditions of instability producing precipitation: it acts as a reagent. Its colour would be of no significance or interest were it not for photometric methods of examination.

Henry's reaction was carried out in the case of 57 malaria patients, comparing the action of melanin, albuminate of iron and saccharate of iron with the action of various coloured indicators and dyes:—carmine, indigo-carmine, diamantfuchsin, phenol sulphophthalein, methylene blue, methyl orange, thymol-sulphophthalein, gentian violet, dahlia violet, methyl orange III, Bengal red, bromo-thymol blue, bromocresol purple, rosaniline, Bismarck brown, toluidine blue, crystal violet. Melanin and the iron salts alone exhibited flocculating properties. The saccharate of iron is very active but difficult to titrate. The indicators and dyes used were found to be completely inert. [See also this *Bulletin*, ante, pp. 266-267.]

Norman White.

BENHAMOU (Ed.) & GILLE (R.). Les facteurs chimiques de la malaria-floculation (réaction de Henry) dans le paludisme anophélien. [The Chemical Factors of Henry's Reaction.]—*C. R. Soc. Biol.* 1935. Vol. 120. No. 40. pp. 1259-1261.

Analysis of the serum in malaria shows an increase of euglobulin and a decrease of serum-albumen and cholesterin. Henry's reaction is dependent upon the quantitative relation of these three substances to one another. The authors express this relation as a fraction,

$$\frac{\text{euglobulin}}{\text{serum albumen} \times \text{cholesterin}},$$
 which they term the "index of flocculability." In normal blood this equals from 0.01 to 0.05 and Henry's reaction is negative; when it is above 0.1 Henry's reaction becomes positive. For example, the index in a case of benign tertian was

$$\frac{\text{euglobulin } 4.5}{\text{serum albumen } 23 \times \text{cholesterin } 0.75} = 0.26,$$
 and Henry's reaction was positive. After treatment with quinine the index was

$$\frac{\text{euglobulin } 3}{\text{serum albumen } 49 \times \text{cholesterin } 1.5} = 0.04,$$
 and Henry's reaction was negative.

W. F.

VILLAIN (G.) & DUPOUX (R.). Contribution à l'étude sérologique du paludisme. (Première note.) Préparation d'une mélanine artificielle (M. A.) et principe de son application à la réaction floculante de Henry. [Henry's Reaction. Preparation of an Artificial Melanin. (M.A.)]—*Bull. Soc. Path. Exot.* 1935. Dec. 11. Vol. 28. No. 10. pp. 915-921.

Introduce successively into a dry flask :—

<i>Tyrosine</i> Poulenc	...	...	...	...	...	0.30 gram.
<i>Perchlorure de fer</i> (solut. officinale)	...	...	...	...	...	0.40 cc.
<i>Eau oxygénée</i> 12 vol.	...	...	...	...	...	10.00 "
<i>Eau distillée</i>	...	...	...	...	...	10.00 "

Plug with cotton and shake. Leave for 15 minutes. Bring slowly to the boil and boil quietly for 1 minute. Pour the hot liquid into a 250 cc. flask containing 180 cc. of boiled, distilled water which is still hot, and boil quietly for 3 minutes.

Cool the flask rapidly under the tap.

After 30 minutes, add 3.20 cc. of N/1 caustic soda.

Leave for 12 hours at the temperature of the laboratory, and filter through a moistened paper.

The dark brown filtrate is the M.A.

It behaves in almost exactly the same way as Henry's melanine.

W. F.

VILLAIN (G.) & DUPOUX (R.). Contribution à l'étude sérologique du paludisme. (Deuxième note.) Technique de la M.A. floculation. (Troisième note.) Résultats obtenus dans la pratique de la M.A. floculation et conclusions. [The Serology of Malaria. Tests with Artificial Melanin.]—*Bull. Soc. Path. Exot.* 1936. Feb. 12. Vol. 29. No. 2. pp. 121-124; 124-130.

The authors describe the technique of their modification of Henry's reaction with the use of an artificial melanin which they call M.A. (see above). They conclude that the results with M.A. and with Henry's ox-melanin are approximately the same; they suggest that

their method should be substituted for the original, more complicated, procedure in out-stations, and should be used as a confirmatory test in central well-equipped laboratories. They found the reaction positive, apart from malaria, in kala-azar, typhus fever and typhoid fever. Doubtful reactions occurred in syphilitics and in recruits undergoing prophylactic inoculations. W. F.

TRENSZ (F.). Etudes expérimentales sur le rôle des euglobulines dans le mécanisme de la mélanofloculation de Henry. [**Euglobulins in Henry's Reaction.**]—*Arch. Inst. Pasteur d'Algérie*. 1935. Dec. Vol. 13. No. 4. pp. 513–565. [63 refs.]

The author describes a series of experiments which he has carried out, and from which he concludes that Henry's reaction is due to qualitative changes in the euglobulin of the serum.

The serum-albumen and serum-globulin are increased in the experimental trypanosomiasis of rabbits. The globulins are not only increased but they become unbalanced, and their instability is shown by an increase in the euglobulins. Melanofloculation becomes positive as the euglobulins increase, and, as the rabbits improve under treatment, the instability of the serum disappears. CHORINE and GILLIER obtained positive reactions in normal serums to which normal euglobulin had been added. This experiment was repeated by the author, who states that the flocculation thus obtained is not a true flocculation, but has only the character of the surflocculation which occurs with distilled water. Normal euglobulin has much less affinity for melanin than the altered euglobulin which is present in malaria. Melanin becomes fixed to this special euglobulin and precipitates it.

The author obtained a characteristic positive reaction in 0.9 per cent. saline to which euglobulin from a case of malaria had been added. The reaction was not given by the other constituents of the serum. When the lipid fraction of the euglobulin was removed by acetone, the euglobulin was no longer precipitated by melanin. The abnormal structure of the euglobulins in malaria is probably imparted to them by the cells in certain parts of the reticulo-endothelial system. Melanoflocculation is not produced by the distilled water, for one can obtain it in undiluted serum. Distilled water is a bad medium for the melano-reaction because it precipitates, in addition to the euglobulins, lipid and protein fractions which play no part in the true Henry's reaction. W. F.

CANCIULESCO (M.) & HIRSCH (R.). Sur la valeur diagnostique du pigment paludéen. Les épreuves de sa concentration dans le sang et dans les urines.—*Bull. Acad. Méd. Roumanie*. Bucharest. 1936. 1st Year. Vol. 1. No. 1. pp. 31–34. [10 refs.]

DALÉAS (Pierre) & LAVERGNE (Jean). Contribution à l'étude du paludisme congénital par la pratique systématique de la réaction de Henry et l'étude des formules leucocytaires chez les accouchées et leurs nouveau-nés. [**Congenital Malaria and Henry's Reaction.**]—*Bull. Acad. Méd.* 1936. Feb. 25. 100th Year. 3rd Ser. Vol. 115. No. 8. pp. 345–354.

Parasites were found in 3 cases out of 887, both in the mother and in the umbilical cord of the infant. In 10 cases, parasites were found in

the mother but not in the child. Henry's reaction was positive in 28 infants ; in half of these the mother's blood gave a positive reaction and in half it did not. In 27 cases the mother's blood was positive and the child's was negative. W. F.

RAYNAL (J.) La mélanofloculation (réaction de Henry au Tonkin). [**Henry's Reaction Tests at Tonking.**].—*Bull. Soc. Méd.-Chirurg. Indochine.* 1935. Dec. Vol. 13. No. 10. pp. 1661-1700. [108 refs.]

This is a review of the literature, and gives the results of the test at Hanoi which do not differ from those elsewhere. W. F.

RAYNAL (J.). La réaction de Henry au Tonkin. Résultats de 853 mélanofloculations.—*Bull. Soc. Path. Exot.* 1936. Jan. 8. Vol. 29. No. 1. pp. 75-82.

MEERSSEMAN (F.) & LAFUMA (J.). Flocculation spécifique et flocculation banale dans la réaction de Henry. Intérêt des lectures photométriques en eau salée.—*C. R. Soc. Biol.* 1936. Vol. 121. No. 1. pp. 54-56.

MEERSSEMAN (F.) & LAFUMA (J.). Le contrôle sérologique du traitement antipalustre par la réaction de Henry.—*C. R. Soc. Biol.* 1936. Vol. 121. No. 1. pp. 52-54.

TRENSZ (F.). Lipoides et mélanofloculation de Henry.—*C. R. Soc. Biol.* 1935. Vol. 120. No. 40. pp. 1268-1270.

LIVIERATO (S. G.) & SALATA (C. Ch.). Recherches biologiques pour le diagnostic du paludisme latent.—*Acta Med. Scandinavica.* 1935. Vol. 87. No. 3-4. pp. 189-212. [26 refs.]

GOOSMANN (Charles). Dark-Field Illumination in the Diagnosis of Tuberculosis and Malaria.—*Jl. Lab. & Clin. Med.* 1936. Jan. Vol. 21. No. 4. pp. 421-424. With 5 figs.

REHDE (Rudolf). Ein Ueberblick ueber die Entwicklung der Malaria-prophylaxe durch Arzneimittel. [**The History of Malaria Prophylaxis by Drugs.**] [Inaugural Dissertation.]—Reprinted from *Ergebnisse d. inneren Med. u. Kinderheilkunde.* 1935. Vol. 49. No. 89. pp. 64-121. With 9 figs. [201 refs.]

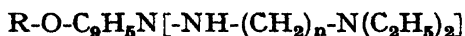
This is a thesis for the degree of Doctor at Kiel University. The author arranges his material under the headings: quinine from its introduction to Europe (1640) to 1880, the year of LAVERAN's discovery; quinine prophylaxis by various methods from 1880 to 1914; quinine prophylaxis in the war years and after; the new synthetic remedies, plasmoquine and atebrin. There are 120 references for quinine and 50 for the newer drugs. Naturally German contributions receive the bulk of attention, e.g., the methods of quinine administration are discussed under the names, PLEHN, ZIEMANN, KOCH and NOCHT. The general conclusion reached is that absolute protection is not obtainable by any method, but the chief reason for this, viz., the failure of quinine to kill the sporozoites introduced by the mosquito, as YORKE and MACFIE showed, is mentioned only in the plasmoquine section.

Many interesting observations are collected and we learn that Robert KOCH, a protagonist of quinine prophylaxis, did not himself practise it in Africa. As an illustration of the difficulty of getting quinine really taken, RUGE cited merchant ships where quinine was served out with rum: the rum was swallowed, the quinine went overboard. Many accounts of the use of quinine for prophylaxis are rendered worthless by the doubt whether the drug was really taken and absorbed.

A sufficient account is given of the introduction and early work on the use of plasmoquine and atebtrin; here Germany takes the lead by right. Those who read German will find a great number of observations on the use of quinine collected here, but how far these are comparable remains uncertain; the snags are numerous. *A. G. Bagshawe.*

HENRY (T. A.). **The Chemotherapy of Malaria.**—Reprinted from *Jl. Soc. Chem. Indust.* 1936. May 1. Vol. 55. No. 18. pp. 111T–117T. [31 refs.]

This is a review devoted to the correlation of antimalarial action, as measured in bird-malaria, with variation in chemical structure in the three principal types of antimalarial drugs, *viz.*, the cinchona alkaloids, plasmoquine and atebtrin. It is shown that quantitative expressions for antimalarial action are not always strictly comparable owing to variations in technique, difference in standards and variations in the birds used, but in spite of these difficulties, a surprising amount of agreement is to be found in the assessment by different observers of antimalarial value throughout the same or similar series of compounds. Thus both the French (Fourneau *et al.*) and the Russian (Magidson *et al.*) teams of workers are agreed as to the dystherapeutic effect of increasing the weight of the alkoxy-group (R-O-) in position 6 of compounds of the plasmoquine type which may be represented by the condensed general formula*



They are also agreed as to the curious alternating effect of increasing the value of *n* in the basic side-chain of these compounds. The activity increases to a maximum with increase in the value of *n* up to *n*=9 after which it falls off, but the peaks at the odd numbers, *n*=3, 5, 7, are higher than those at the even numbers, *n*=2, 4, 6. Less work has been published regarding the acridine series of antimalarials to which atebtrin belongs and which may be represented by the general formula $\text{R-O-C}_{13}\text{H}_8\text{NCl}[\text{-NH-(CH}_2\text{)}_n\text{-N(C}_2\text{H}_5\text{)}_2]$. In this set antimalarial activity increases with rise in the value of *n* up to *n*=4 and then diminishes, which is the normal behaviour of items in a homologous series.

In the cinchona alkaloid group the most interesting points dealt with are the inhibition of anti-malarial activity (*a*) by the formation of an ether-oxide link between the central -CHOH group and the -C₂H₄-side chain as in *β*-isoquinidine (see formula 2 below) and (*b*) by optical inversion at the -CHOH- group as in *epi*quinidine. Thus taking quinidine as a starting point and using Qn and Qdn to represent the quinoline and quinuclidine halves respectively of the molecule, the following remarkable changes in antimalarial activity result from the

* Complete diagrammatic formulae for this and other types of drugs referred to have been given already [this *Bulletin*, 1935, Vol. 32, p. 385].

slight chemical and physical changes (direction of optical rotation at -CHOH shown in [] indicated.

1. Quinidine. $\text{CH}_3\text{O-Qn-CHOH-Qdn-CH=CH}_2$. [CHOH, +] Active.
2. β -isoQuinidine. $\text{CH}_3\text{O-Qn-CHO-Qdn-CH-CH}_3$. [CHOH, +] Inactive.
3. *epi*Quinidine. $\text{CH}_3\text{O-Qn-CHOH-Qdn-CH=CH}_2$. [CHOH, -] Inactive.

It is, however, not merely negative optical rotation at the -CHOH group which determines antimalarial inaction because quinine, the most active of all the cinchona alkaloids is laevorotatory at that point, and a consideration of all the results indicates that although a particular type of structure may appear to be associated with specific action, it is the combination of chemical and physical properties determined by that structure which is effective and any change in that structure producing an alteration in chemical or physical properties or both, may well inhibit antimalarial action.

T. A. Henry.

ROSA (Alberto) & VALLI (Enea Suzzi). L'atebrin e la plasmochina nella bonifica umana antimalarica. [**Atebrin and Plasmoquine as Malaria Prophylactics.**—*Riv. di Malarologia*. Sez. I. 1936. Vol. 15. No. 1. pp. 32-59. With 3 figs. (2 maps). French summary.

The term "human bonification" here implies intensive treatment of persons before the usual annual outbreak of malaria in two highly malarious zones of Basso Ferrarese—S. Giuseppe and Gorino. The author describes the geographical position, the economic condition, and the malaria prevalence of these places. In S. Giuseppe of 1,620 inhabitants the splenic index was 28.4 and the malaria incidence 30.1 per cent. In Gorino among 83 children examined the splenic index was 21.6. The general plan of treatment was to give atebrin daily for 5 days and then, after an interval of 3-6 days, 3 days' course of plasmoquine; atebrin 0.1 gm. and plasmoquine 0.01 gm. per tablet. The dosage was one tablet up to 4 years, two for those between 4 and 8, for those over this 3 tablets. During the summer quinoplasmine was given, 10 days drug, repeated after a 10-day interval, in dosage of 0.9 gm. sulphate of quinine and 0.03 gm. plasmoquine for 3 days and 0.6 gm. and 0.02 gm. respectively for the other 7 days, for adults. The incidence of malaria was considerably below that of the previous year: In S. Giuseppe from 30.1 in 1933 to 5.1 in 1934 and in Gorino with 500 inhabitants from 30.9 to 18.7 per cent. [in another place the last figure is given as 17.8].

H. H. S.

KRÖBER (Friedrich). Erfahrungen mit Atebrin, per os zur Prophylaxe, per injectionem zur Behandlung der Malaria. [**Atebrin by Mouth for Prophylaxis and by Injection for the Treatment of Malaria.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. Mar. Vol. 40. No. 3. pp. 119-123.

Experiences with atebrin in Tanganyika Territory in prophylaxis and treatment of malaria.

The observations were made during the fever season, which corresponds with the rainy season, and during this period fresh infections are always occurring. The prophylaxis was undertaken in natives amongst whom adequate control observations could be carried out. Sixteen adults and 14 children were given atebirin as a prophylactic. The author's scheme was to give one tablet, 0.1 gram., atebirin on Monday, Wednesday, Thursday and Saturday for six weeks as this is the maximum period for the rainy season. Children received smaller doses, 0.05 gram, half a tablet 1-6 times weekly according to age. Without exception the adults and children remained free from fever and fit for work, whilst many of the controls had fresh infections with parasites in the blood. After cessation of the atebirin the controlled observations were continued for 4 weeks longer, and it was found that of those who had taken atebirin only one person, a 12-year old boy, developed fever with rings of malignant tertian in his blood, all the rest remained well. Following this satisfactory result, the author advised all Europeans, who lived in malarial districts, to adopt this prophylaxis and reports received are satisfactory.

For the treatment of severe malaria he has found the new preparation, atebirin musonate, very useful. He prefers the dry powder to the prepared solution. Each ampoule contains 0.1 gram, and this is dissolved in 3 cc. distilled water and given intramuscularly; in more urgent cases intravenously, injected very slowly. Later he gave 0.2 gram in 5 to 6 cc. water. For small children the dose was 0.03 to 0.05 gram, intramuscularly. For children of 10 and over, 0.06 to 0.1 gram. per dose. It was well tolerated. He considers that the injections are valuable in severe cases of malaria with loss of consciousness and intestinal disturbances, which interfere with oral administration. He follows up the injections with oral administration of atebirin and plasmoquine simplex.

E. D. W. Greig.

VOORHOEVE (H. C.). Een nieuwe vorm van chininetoediening bij malaria. [**A New Form of Quinine Administration in Malaria.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1936. June 9. Vol. 76. No. 23. pp. 1441-1449. [10 refs.] English summary.

Six years ago TABOLOFF, in order to counteract the tendency of quinine to bring about a leucopenia, suggested the quinine being given intramuscularly with glycerol, iodine and adrenalin. The author first compared the results, as regards the white cell counts, of giving the new mixture to 10 persons, and of giving injections of quinine to 10, and using another 10 as controls. He did not find the first presented any increase in leucocytes. He then carried out a larger series of tests: to 37 persons with tertian malaria were given quinine tablets, to 70 quinine bihydrochloride in solution, to 120 quinine in ampoules, 12 were treated with aristoquine, 52 with quinoplasmine and 57 with the iodine quinine. In a table the results are given, divided into 3 groups: (1) those in whom the temperature fell by crisis; (2) those with lytic fall, and (3) those with an irregular temperature curve. In 34.4 per cent. (11 persons) of the quinine tablet group, in 28.6 per cent. of those having the solution and in 40.4 per cent. of the quinoplasmine group, the temperature fell by crisis; in 56.2 per cent. of the quinine mixture group. Not only was this better result observed on the fever, but also in disappearance of plasmodia with this drug. Two cases with splenic

enlargement not reduced by other methods showed considerable reduction with the iodine quinine mixture. The mode of preparation of this mixture is as follows :—

8 gm. bihydrochloride of quinine are dissolved by aid of heat in 5 cc. distilled water ; next, 0.2 gm. iodine is dissolved in 22 cc. glycerin, and the two solutions mixed, filtered while warm and sterilized by heating in a water-bath for 15 minutes and 1 cc. of 1/1,000 solution of adrenalin hydrochloride added. The author says that he has not confirmed the statement that after 12 hours a precipitate settles down and that it is advisable therefore to heat the mixture to the body temperature before injecting it.

H. H. S.

KUBO (M.). On the Alleviation of the Toxic Symptoms of Quinine.
—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1936. Jan. Vol. 35. No. 1 (370). [In Japanese pp. 196-204. English summary p. 205.]

This is an account of experimental work carried out on white mice to show the effect of stimulation of the reticulo-endothelial system on combating the ill-effects of quinine. The author found that quinine given in a dose of 0.03 cc. of a 0.7 per cent. solution per gm. bodyweight caused death in a little over 5 days, average 5.3. If at the same time the same dose of 0.5 per cent. egg-albumen was injected, death did not take place till 20.7 days ; with the same dose of double strength albumen (1.0 per cent.) death occurred a little earlier, average 20.0 days. Stimulation by exposure to ultra-violet rays, though prolonging the interval, was not so effectual as the egg-albumen. Thus, after exposure to the rays for 6 days, the quinine was injected, and the animal exposed to the rays at a distance of 50 cm. for 20 minutes twice daily ; death occurred after an average of 15 days.

H. H. S.

SANDERS (J. P.). Treatment of Malaria with a Short Course of Quinidine.—*Amer. Jl. Trop. Med.* 1935. Nov. Vol. 15. No. 6. pp. 651-660.

Plantation negroes treated successfully with 4 or 5 day courses of quinidine consisting of 40 to 70 grains in all.

From 1930 to 1933, the author employed quinidine or quinine in 10 grain doses once a day for 4 days. Quinine stopped the fever in about 4 days, quinidine in about 2. Malaria became more prevalent and severe after a flood in 1933 and from then onwards the treatment was altered to a five-day course of quinidine : 20 grains on each of the first 2 days and 10 grains on each of the other three. A total of 1,047 cases, in 864 individuals, was treated during the 5 years 1930 to 1934 by the short course of quinidine ; 420 benign tertian, 243 subtertian, 384 no parasites found. "The patient was practically always well in less than a week and back at work, a result most satisfying to patient, physician and plantation owner." The quinidine was purchased in 5 grain capsules, and the average cost per patient was apparently about 25 cents per annum. This work was done near Shreveport, Louisiana, and most of the patients were plantation negroes. [Presumably they were a relatively immune population and responded readily to treatment.]

W. F.

BARBOSA (Amando). La quinina y la asociación quinina-plasmoquina en la prevención de las recidivas de terciana benigna. (Estudio comparativo.)—Reprinted from *Africa Médica*. 1936. No. 8. 15 pp. With 2 graphs.

SONNENSCHN (C.). Schädigung durch Plasmochin-Ueberdosierung. [**Damage from Overdosing with Plasmoquine.**]—*Arch. f. Schiffs- u. Trop. Hyg.* 1936. Apr. Vol. 40. No. 4. pp. 165–166.

A case is described which presented the typical picture of plasmoquine poisoning of average severity and this was ascribed to relative overdosing and to the simultaneous administration of plasmoquine and atebirin. The patient weighed only 48 kgm. and had suffered from several malarial relapses, flagellate colitis and anaemia. In 5 days she had taken, as well as atebirin, 15 tablets of plasmoquine each 0.01 gm., and in addition 0.06 gm. plasmoquine was given by injection. In all 0.21 gm. plasmoquine within four and a half days. The author warns against the simultaneous administration of plasmoquine and atebirin.
E. D. W. Greig.

DECOURT (P.). Etudes sur la toxicité de la praequine (plasmochine) et de la rhodoquine (710). (Deuxième note.) [**The Toxicity of Praequine (Plasmoquine) and Rhodoquine (710).**]—*Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 328–336.

The two drugs given together exert a combined therapeutic action, but not a combined toxic action.

These drugs are not equally toxic for all laboratory animals, but generally speaking praequine is twice as toxic for them as rhodoquine. In man they are of equal toxicity. The sign of intolerance of praequine is cyanosis with the formation of methaemoglobin; it attacks the blood corpuscles and the myocardium, both of which are of mesodermic origin. Rhodoquine, in big doses, does not produce cyanosis; it attacks the nerve cells which are of ectodermic origin, and it causes vertigo and palsies. It is often convenient to give a gametocidal drug at the same time as atebirin or quinine is given, though it is safer to give it as a separate course of treatment. For example, 0.3 gram atebirin with 0.03 gram plasmoquine daily for 5 days was followed by toxic symptoms in several cases. It occurred to the author that as praequine and rhodoquine had entirely different toxic actions, it was probable that if they were given together, they would in no way help one another to poison the patient. He carried out many experiments on animals which confirmed his hypothesis that when two drugs exert their toxic action on systems of different embryological origin, they do not associate their toxicity when they are given together. For example, when a dose of x grams of praequine was given to mice, 55 per cent. died, and when y grams of rhodoquine were given 40 per cent. died. When, however, x grams of praequine and y grams of rhodoquine were given together, not $55+40$ per cent., but only 55 per cent. of the mice died. He next tried the mixture on man and found that it acted in the same way. The gametocidal, therapeutic action was the sum of that of each of the drugs, but the toxic action was not. He recommends that these two drugs should be given together in equal quantities for 3 days and that the daily dose of the mixture should never exceed 0.03 gram. This treatment has been extensively employed for the last 2 years without causing any toxic symptoms.
W. F.

HOOPS (A. L.). **The Advantages of Atebrin in the Treatment of Malaria amongst Controlled Labour Forces in Malaya.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. Nov. 25. Vol. 29. No. 3. pp. 249–259. [38 refs.]

“Atebrin is the best drug available for the controlled treatment of all types of malaria in Malaya.”

The labour forces in question number some 20,000. The atebrin treatment consisted of 0.3 gram daily for a period of 5 days. If the temperature was above 99°F. on the third or fourth days, the treatment was continued for one, or for two, days longer. In subtertian cases and in some relapsing cases of benign tertian, the atebrin was followed by a five-day course of plasmoquine, 0.01 gram three times a day. This was the treatment for adults and for children over 10. Smaller doses were given to younger children, but those under 6 were not given plasmoquine without special orders. The quinine treatment which was formerly employed consisted of 30 grains a day for the first week or ten days, and 10 grains a day for 3 weeks. Atebrin treatment actually costs less, and there is a still greater saving effected by the low relapse rate, lessened absence from work, and greater efficiency. Atebrin is not a substitute for antimalarial measures such as drainage and oiling, but it is a great adjunct to them.

Atebrin has been in use on the Malacca Estates since the middle of 1932, and since then the numbers of deaths and the numbers of patients admitted to hospital have been less than in any year since they were first recorded in 1925. This improvement the author attributes partly, but not entirely, to the use of atebrin. No case of blackwater fever has occurred since the middle of 1932. The relapse rate has been very low: in 600 cases, observed for at least 8 months after treatment, it was about 15 per cent. in benign tertian, and 7 per cent. in subtertian; “it is to be borne in mind that some of the further attacks of malaria must have been new infections though all are counted as relapses.” There were very few toxic symptoms. In 1,207 cases there was only one case of cerebral excitement; this was a male Tamil in whom the condition developed on the 4th day of treatment and passed off in 3 days. Severe headache occurred in a few patients. Violent vomiting was rarer than with quinine. Severe colic occurred in 9 patients, 7 of whom were taking plasmoquine. The author states that he is not in agreement with those workers who prefer to allow the patient to pass through several attacks of malaria, controlled by small doses of quinine, with the object of producing immunity. He argues that this must produce a number of reservoirs for the spread of infection and he writes, “we aim at preventing the reinfection of the cured sufferer from malaria and we therefore do not take the risk to himself and others of trying to produce a possible immunity.” With this object he has employed atebrin instead of quinine since the middle of 1932, on all the estates of the Malacca Agricultural Medical Board. (See HOOPS, this *Bulletin*, 1933, Vol. 30, pp. 476 and 843; 1934, Vol. 31, pp. 678 and 695.) W. F.

SECKINGER (Daniel L.). **Atabrine and Plasmochin in the Treatment and Control of Malaria.**—*Amer. J. Trop. Med.* 1935. Nov. Vol. 15. No. 6. pp. 631–649. With 2 figs. [21 refs.]

In rural malaria where drainage is impracticable, atebrin and plasmoquine are of great value in a country where there is a definite malaria season.

This study was made in an area of Calhoun County, Georgia, where drainage would be very difficult because of the numerous lime-sinks. The area is entirely rural; it is 54 miles square with a population of 1,325, most of whom are negroes. The parasite index of the school children in the autumn of 1932 was 80 per cent. Two adjacent areas were selected, one for treatment and one as a control. The treatment was as follows: plasmoquine 0.01 gram, three times a week was given to everyone in the treated area, and, whenever anyone had malaria, he and all his household received a five-day course of 0.3 gram atebirin daily. This treatment was carried out in the malaria season, which lasts from May until the end of October, during the years 1933 and 1934. The result was a very material reduction in infection: at the beginning of treatment in 1933, 24.7 per cent. were infected; at the height of the malaria season in October, only 10.9 per cent. The corresponding figures in the control area were 29.3 in May and 60.3 in October. The crescent rate in October was 21 per cent. in the treated area and 36 per cent. in the untreated. The results in 1934 were equally good, but were complicated by treatment of the control group during October. [There is also the complication of a misprint in the tables.] The percentage of those originally negative who subsequently became positive was 27.8 in the treated area as compared with 69.0 in the control area. KOMP and CLARK who attempted the control of malaria with drugs in isolated villages in Panama did not meet with success. [This *Bulletin*, 1935, Vol. 32, p. 784.] The author discusses the reasons for the different results. (1) In Panama, mosquitoes and malaria are present throughout the year, but in Georgia there is a definite malaria season followed by a period of 6 months during which there is little or no transmission. (2) The Panama experiment was made in villages, where an infected mosquito may easily infect a large number of people, but the author's investigations were made in a very sparsely populated rural area.

W. F.

HAY (D. C.), SPAAR (A. E.) & LUDOVICI (H. L.). **Atebrin Treatment in Malaria.**—*Indian Med. Gaz.* 1935. Dec. Vol. 70. No. 12. pp. 678-679.

No abscess resulted in 3,500 cases treated with injections. Mental disturbance occurred in about 5 cases per 1,000.

The authors have treated 3,500 patients in their private practice with two injections of either atebirin dihydrochloride or atebirin musonate. In each case, the injections were followed by a six-day course of two 0.1 gram tablets of atebirin daily by the mouth. Each of the two injections consisted of 0.15 gram of the dihydrochloride, or its equivalent in musonate, bringing the total quantity up to 1.5 grams of atebirin for an average adult. The therapeutic results were excellent. There was not a single case of collapse after injection, nor any death attributable to the drug. No abscesses occurred in the whole series, and pain at the site of injection was negligible. Cases of mental excitability occurred in about 5 cases per thousand, and occasionally patients complained of headache, restlessness and insomnia. Toxic symptoms, on the whole, were rare: one patient confessed, after an injection of the dihydrochloride, that he had already swallowed 10 tablets on that day, but no ill-effects followed, and the man was back at work within 24 hours. Mental symptoms when they occurred were readily controlled by sedatives.

W. F.

i. UDALAGAMA (Lyn). **Mental Derangement in Malaria Cases treated by Atebrin-Musonate Injections.**—*Indian Med. Gaz.* 1935. Dec. Vol. 70. No. 12. pp. 679-683.

ii. INDIAN MEDICAL GAZETTE. 1935. Dec. Vol. 70. No. 12. pp. 687-688.—**Malaria, Atebrin and Mental Disturbances.**

i. Details of 7 cases.

The standard treatment with atebrin musonate was two injections, each equivalent to 0.3 gram of atebrin, with an interval of 24 hours between the injections. [This is double the dose given by HAY and his colleagues, see above.] Mental symptoms appeared in 7 out of 644 cases treated as out-patients at the Narammala Field Centre, Ceylon. All the patients were examined as to fitness for treatment, and they were given food before and after the administration of the injection. The following is a short abstract of the details of the 7 cases given by the author.

Onset.	Duration	Symptoms
1. 2 hours after 2nd injection ...	17 hours	Abusive, restless and violent. Memory a blank for this period
2. 3½ hours after 2nd injection ...	36 hours	Severe headache, talking incoherently, restless
3. 1 hour after 2nd injection ...	? 17 days	Dazed and indifferent to surroundings. Transient symptoms after 1st dose
4. 2½ days after 2nd injection ...	42 days	Gradual onset; made mistakes in writing out the charms by which he made his living. Later became violent, threatened to kill wife and was removed by police. Memory a blank for period of mental disorder
5. 1½ hours after 2nd injection ...	not yet recovered	Irritable, sleepless and melancholic
6. ? 12 hours after 2nd injection	died	Dazed
7. 1½ hours after 2nd injection ...	8 days	Violent and abusive

ii. The dangers of atebrin have been exaggerated.

The writer of this leading article considers that the effect of atebrin in producing mental disturbance has been exaggerated; "these ill effects have been attributed to atebrin *per se*, and a false impression has been created. . . . However, the evidence that we now have before us does seem to indicate that there is some aetiological connection between these mental disturbances and the administration of atebrin in a malarial subject." He points out that the symptoms in cases 6 and 7 of Dr. Udalgama's series were probably not due to atebrin, and that therefore the incidence of mental symptoms was about one in every hundred cases treated. Dr. HAY and his colleagues (see above) used doses only half as large, they saw only half as many cases of mental

disturbance, and such as occurred were mild, of short duration and easily controlled by sedatives.

W. F.

FOY (Henry), KONDI (Athena) & PERISTERIS (Michael). **Studies on Atebrin. A Controlled Field Experiment to test the Relapse Value of Atebrin.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. June 30. Vol. 30. No. 1. pp. 109–114.

The object of the observations described in this paper was to determine the malaria parasitic relapse rate after treatment with atebrin. The inquiry was carried out in the village of Samsus, about 38 miles inland from the western coast of Epirus (Greece). In January 1933, when the work was begun, the spleen rate of the village was 92 per cent. and the parasite rate 39 per cent. (*P. vivax* 68 per cent., *P. falciparum* 20 per cent., *P. malariae* 4 per cent., mixed 7 per cent.) In the previous August the parasite rate had been 58 per cent. The season of active malaria transmission in Greece is from June to October; the observations were thus carried out at a period when new infections were at their lowest or non-existent.

Two hundred villagers were selected at random, avoiding, however, children under five years of age. The blood of each was examined on three successive days, on the last of which treatment was begun. For treatment these villagers were divided into four groups. To each member of the first group atebrin was given; 0.2 gram a day for five days to children, 0.3 gram a day for five days to adults.

The members of the second group received quinine and plasmoquine each day for five days as follows:—

ages 5 to 10,	0.8 gm. quinine	+ 0.01 gm. plasmoquine
„ 10 to 15,	1.5 „	+ 0.01 „
„ above 15,	2.0 „	+ 0.02 „

The members of the third group received quinine alone for five days as follows:—

ages 5–10, 0.8 gm. quinine; 11–15, 1.5 gm.; above 15, 2.0 gm.

The fourth group was the control group to each member of which bicarbonate of soda was given.

The blood of all persons under observation was re-examined on three occasions during the first week of May and the percentage of those harbouring demonstrable parasites is the relapse rate of the authors. In the atebrin group this relapse rate was 12 per cent.; in the quinine and plasmoquine group, 17.5 per cent.; in the quinine group, 27 per cent.; in the control group the May infection rate was 36 per cent.

[In estimating the parasite relapse rate no account is taken of the infection rates in the various groups at the beginning of the observations. In the atebrin group the infection rate fell from 47 to 12 per cent.; in the quinine and plasmoquine group from 32.5 to 17.5 per cent.; in the quinine group from 33.3 to 27 per cent., and in the control group from 42 to 36 per cent.]

Norman White.

CARMAN (J. A.) & CORMACK (R. P.). **A Controlled Experiment in the Treatment of Malaria and Atebrin-Musonate by Injection.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Jan. 25. Vol. 29. No. 4. pp. 381–396. With 1 chart.

The results of 3 injections were similar to those of a five-day course of oral atebrin. Symptoms were relieved as readily as by quinine injections and convalescence was shorter.

Thirty-three cases of malignant tertian were treated with atebirin musonate injections and 33 were treated with quinine and plasmoquine. The temperature came down, the asexual parasites disappeared and the short duration of the treatment was a great advantage. There were no toxic symptoms. The authors are of the opinion that the number of relapses was much less than it would have been after quinine. A drawback was the expense: 15 tablets of atebirin costs two shillings, one ounce of quinine costs the same, but one ampoule of atebirin costs half-a-crown. The authors recommend the intramuscular injection of one 0.375 gram ampoule daily for 3 days. The high cost makes it unsuitable for native hospitals, "but the slight inconvenience involved and lack of all unpleasant toxic symptoms make it a strong rival to quinine and oral atebirin for patients able to bear the expense."

W. F.

BROWN (A. Forbes). Initial Impressions of Atebrin-Plasmoquin in the Treatment of Malaria in Uganda.—*Jl. Trop. Med. & Hyg.* 1935. Dec. 16. Vol. 38. No. 24. pp. 301–304. With 10 charts.

Atebrin is a better remedy than quinine.

The author's impression after treating 200 cases with atebirin, and plasmoquine, is that further experience will probably bring him to the conclusion that quinine should be discarded in favour of "this shorter, less unpleasant, and, to my mind, more efficacious remedy." The treatment given was: atebirin 0.1 gram and plasmoquine 0.01 gram three times a day, for 5 days. No toxic symptoms were noted. The author states that the retail price of atebirin is 4 shillings for the 15 tablets necessary for a 5-day course—"admittedly expensive, but a course of retail quinine, say of 30 grains daily for 1 week, would be just as expensive and much more unpleasant." [Probably he does not mean to imply that quinine costs more than 8 shillings an ounce in Uganda, but that recovery is so much quicker with atebirin treatment.]

W. F.

MANSON (D.). Atebrin-Plasmochin in the Treatment of Malaria.—*Indian Med. Gaz.* 1936. Mar. Vol. 71. No. 3. pp. 127–132.

Toxic symptoms occurred in several cases treated with 0.3 gram of atebirin and 0.015 gram of plasmoquine daily for 5 days. In every case there was some abnormality of the gastric juice, either too much or too little hydrochloric acid.

These experiments were carried out in the central hospital of a group of tea gardens in Assam. The patients remained in hospital for at least a week and they were seen once a week afterwards for a period of 6 months. Twenty-one of the patients were treated with atebirin 0.1 gram t.d.s. and 50 were treated with the same dose of atebirin, together with plasmoquine, either 0.0033 or 0.005 gram with each dose, the small difference in quantity made no apparent difference. Treatment in both groups lasted five days. The fever and the parasites disappeared rather more quickly in the plasmoquine group, but the numbers are small. Six cases are recorded in which toxic symptoms occurred in the plasmoquine group. In two cases there was hyperchlorhydria, in three cases there was complete achlorhydria, in one there was cholecystitis. The author concludes that "there seems to be a definite connexion between achlorhydria, the biliary system, and the

production of toxic symptoms after the exhibition of atebrin and plasmochin." Two of the patients who suffered from toxic symptoms were subsequently given the same drugs in keratin coated dragées without ill effects. The percentage of relapses in these patients, treated either with atebrin alone or with atebrin plus plasmoquine, was about 11 per cent. in 6 months, as compared with 40 per cent. after quinine treatment.

W. F.

CHOPRA (R. N.), GUPTA (J. C.) & SEN (B.). **A Comparative Study of the Action of Atebrin and Atebrin-Plasmochin Combination on Indian Strains of Malaria.**—*Indian Med. Gaz.* 1936. June. Vol. 71. No. 6. pp. 309–313.

This report from the Department of Pharmacology of the Calcutta School of Tropical Medicine gives the results of treatment of fifty-four cases of malaria in the Carmichael Hospital, with atebrin-plasmoquine and compares these results with those obtained by the treatment of a previous series of cases with atebrin alone. The preparation used was Bayer-Meister Lucius dragées containing 0.1 gm. of atebrin and 0.0033 gm. of plasmoquine. One dragée given three times a day for five consecutive days was the "usual dose for an adult." Twenty cases were infected with *P. vivax*, 19 with *P. falciparum*, 4 with *P. malariae* and 7 were mixed infections. The age and sex of the patients are not given. All patients were kept under observation for at least a fortnight after treatment, daily blood examinations being carried out.

The authors conclude that, in so far as the disappearance of parasites from the blood is concerned, the combination of the two drugs is no more effective than atebrin alone in benign tertian and quartan infections. Practically all *P. vivax* had disappeared on the fifth day. In malignant tertian infections, however, the combination is more effective. On the sixth day 86.5 per cent. of the cases so treated showed no parasites, whereas in only 55.5 per cent. of cases treated with atebrin alone were no parasites found. The relapse rate in all forms of infection is definitely lower if treated with the two drugs combined. Figures on which this conclusion is based are not given. There appeared to be no relationship between the number of parasites in the peripheral blood and the time taken for their disappearance under treatment.

Norman White.

GOVINDASWAMY (M. V.). **Atebrin Poisoning.** [Correspondence.]—*Lancet.* 1936. Jan. 4. pp. 56–57.

A man aged 32 was admitted to the Mysore Government Mental Hospital with symptoms resembling delirium tremens. He was a total abstainer. He shouted that he saw snakes and fantastic animals crawling on the floor, and he reacted to these hallucinations with so much fear and violence that it was necessary to restrain him. The pupils were dilated; nystagmus was present; speech was slow and hesitating; there were fine tremors of the tongue and hands. The pulse was rapid and he was deeply jaundiced. His temperature was normal; no malaria parasites were found. His mental symptoms cleared up in 3 days, and the jaundice in 7 days. During the 8 days before admission he had been given two atebrin pills daily, and 3 injections of atebrin musonate.

W. F.

KEHAR (N. D.). **Observations on the Absorption and Excretion of Atebrin.**—*Records of the Malaria Survey of India*. 1935. Dec. Vol. 5. No. 4. pp. 393–404. With 4 graphs. [26 refs.]

Oral atebrin is rapidly absorbed and can be detected in the urine 15 to 30 minutes after a single dose of 0.3 gram.

Volunteers were given three doses of atebrin by the mouth, with an interval of one or three hours between the doses, and their urine was examined by the method of WATS and GHOSH (this *Bulletin*, 1935, Vol. 32, p. 749). Monkeys were given injections of atebrin dihydrochloride and their urine was examined in the same way. When a single 0.3 gram dose was given by the mouth, atebrin appeared in the urine within 15 to 30 minutes; when it was given in 0.1 gram doses it took about 60 to 90 minutes. The greatest concentration in the urine occurred during the first 24 hours after a single dose of 0.3 gram, but, when the same amount was divided into 3 doses with 3 hours between them, the greatest concentration occurred on the second day. Qualitatively the presence of atebrin could be detected as long as 55 to 69 days. The greater the amount of the urine, the quicker the rate of excretion. Because of the rapid absorption of atebrin given by the mouth, there can be little advantage in giving it in any other way. In severe cases it may be advisable to give 0.3 gram in one dose on the first day of treatment. From 49 to 69 per cent. of the dose of atebrin was excreted in the urine during 16 to 28 days after its administration. The author questions the accuracy of HECHT's theory which is to the effect that the atebrin is taken up by the duodenum, passed to the liver, and excreted with the bile back into the duodenum. W. F.

KEHAR (N. D.). **The Influence of Food in the Stomach on the Absorption and Excretion of Atebrin.**—*Records of the Malaria Survey of India*. 1935. Dec. Vol. 5. No. 4. pp. 405–411. With 1 fig.

A single dose of 0.3 gram of atebrin was given to volunteers (a) on an empty stomach, or more than 2½ hours after a meal; (b) less than 2 hours after a meal. A corresponding dose of atebrin musonate was given in the same way. It was found that when the drug was taken fasting, it appeared sooner in the urine, and the quantity excreted during the first 24 hours was greater than when it was taken on a full stomach. Atebrin and atebrin musonate given by the mouth appeared in the urine at the same rate, but the total excreted during the first 3 days was greater in the case of atebrin musonate. W. F.

SIMEONS (A. T. W.). **Mass Treatment with Injectable Atebrin.**—*Indian Med. Gaz.* 1936. Mar. Vol. 71. No. 3. pp. 132–137. With 1 chart.

Good results of mass treatment with injections in (a) hospital staff, (b) isolated village, (c) population of 5,650 in a mill area. Dosage scheme. Two deaths followed plasmoquine given after atebrin musonate. Deterioration of solution on keeping. One per cent. of abscesses after inoculation. Ascribed to sepsis.

The staff of Kurunegalle Hospital, Ceylon, numbering 65 persons, was inoculated with 0.3 gram of injectable atebrin (0.375 gram musonate) dissolved in 9 cc. of water; the inoculation was repeated on the following day. Before treatment, 36 had parasites in their blood. The patients went on with their duties; the injections were painless,

though in some cases there was subsequent tenderness at the site of inoculation. Two days later, the inoculated persons were all free from parasites. There were no relapses or new infections of the staff during the next 5 weeks, but in the following week there were six.

All the 250 inhabitants of an isolated village in the Kurunegalle district were given two inoculations. Before the inoculations, parasites were present in 40 per cent. A week later, 4.5 were positive, and, during the next 6 weeks, only 7.6 per cent. complained of fever.

At the Godak Mills in the Mahratta country of India 5,650 persons were treated. Healthy adult males were given 9 cc. of a solution containing 0.3 gram of atebirin in 9 cc. of distilled water. Children were given the following doses of the same solution :—

Up to 6 months ...	0.5 cc.	6 to 10 years ...	4 cc.
$\frac{1}{2}$ to 2 years ...	1.0 cc.	10 to 12 „ ...	5 cc.
2 to 4 „ ...	2.0 cc.	12 to 15 „ ...	6 cc.
4 to 6 „ ...	3.0 cc.	15 to 18 „ ...	7 cc.

Each person was given a second injection on the following day and also 3 tablets of 0.02 gram of plasmoquine with instructions to take one a day. In 4 cases haemoglobinuria occurred after the third plasmoquine tablet had been taken, and two of the four patients died. Abscesses occurred at the site of inoculation in 49 patients; this is attributed to sepsis. No toxic symptoms attributable to atebirin were seen beyond a few cases of giddiness and fainting. The solution for the day was made up in the morning, and it was noticed that the cases of giddiness occurred in the afternoon, several hours after the solution had been made. If patients were inoculated with a solution which had been kept overnight, there were still more cases. Subsequently, the solution was prepared in small quantities for immediate use, and no more cases occurred. The result of the “blanket treatment” of the mill-hands appears to have been excellent, during a period of 7 months there were only 55 relapses.

W. F.

KARIADI. Enkele ervaringen met chinine en atebirin bij de behandeling van chronische malaria in verband met het optreden van zwartwaterkoorts te Manokwari (Julianaziekenhuis).—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1936. Apr. 7. Vol. 76. No. 14. pp. 860-879. With 14 charts. [13 refs.]

ZIEMANN (Hans). Zur modernen Therapie und Prophylaxe der Malaria (speziell mit Atebrin und Plasmochin).—*Med. Klin.* 1936. May 29. Vol. 32. No. 22 (1641). p. 745.

BARBOSA (Amando). Un ensayo de profilaxis antipalúdica con atebirina y plasmoquina.—Reprinted from *Gac. Méd. Española*. 1936. No. 114. pp. 3-7.

DECOURT (Philippe), VILLAIN (Georges), MARINI (Charles) & DUPOUX (Robert). Expériences de prophylaxie collective du paludisme par les produits synthétiques effectuées en Tunisie au cours de l'année 1934. [**Prophylaxis of Malaria by Synthetic Drugs.**]—*Arch. Inst. Pasteur de Tunis*. 1936. Jan. Vol. 25. No. 1. pp. 154-198. With 1 fig. & 1 map.

In favour of drug prophylaxis.

The authors used the following drugs separately in a prophylactic experiment. Quinacrine (atebrin) 0.4 gram once a week; Praequine

(like plasmoquine) 0.03 gram once a week; Rhodoquine in the same doses; Quinine 0.4 gram (6 grains) every day. Each group of persons, except the quinine group, was given a preliminary five-days' treatment with quinacrine 0.3 gram daily; the quinine group received 5 days' preliminary treatment with quinine. The results of 6 weeks prophylactic treatment were good.

With quinacrine, the parasitic index fell from 23 to 0.5 per cent. and the gametocyte index from 21 to 5. The results in the quinine group were almost the same, but its daily administration gave rise to considerable difficulties. The results with praequine and rhodoquine were almost the same.

Next, some 750 persons were given prophylactic treatment once a week with quinacrine and praequine together. There were no accidents. The result in adults was a reduction of the parasitic index from 72 to 42 per cent., while in the control group the figures were 85 and 80.5 per cent.

W. F.

RAGIOT (Ch.). Paludisme au cours de la fièvre typhoïde. Action de la quinacrine. [**Malaria in Typhoid Fever. Its treatment with Quinacrine.**—*Rev. Méd. et Hyg.-Trop.* 1935. Nov.-Dec. Vol. 27. No. 6. pp. 315-321.]

Some authorities consider that quinine should not be given to patients suffering from typhoid fever, because it might have a bad effect upon a heart already damaged by the disease, and upon a nervous system debilitated by fever. The author gives details of 9 cases of typhoid fever complicated by malaria, in which quinacrine (French atebtrin) was given without any ill effects, and he recommends this drug for the treatment of malaria occurring during the course of typhoid fever.

W. F.

FIELD (J. W.) & NIVEN (J. C.). **A Clinical Comparison of Atebrin-Musonate with Quinine Bihydrochloride. (A Preliminary Report based on the Treatment of 286 Cases of Acute Malaria.)**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Apr. 8. Vol. 29. No. 6. pp. 647-658. With 7 figs.

A method for detecting atebtrin in dilute solution is given. Dosage of atebtrin discussed. Two cases of fits following atebtrin. Intramuscular route preferred to intravenous. Atebrin musonate acts a little more quickly than quinine.

A series of cases was treated with atebtrin musonate (dimethane sulphonate of atebtrin) administered either by intramuscular or intravenous injection. For intramuscular injection the contents of one ampoule were dissolved in 2.5 cc. of sterile tap-water. Solution was complete in 3 minutes. One ampoule contains 0.375 gram, which is equivalent to 0.3 gram of atebtrin, and in this paper the doses are expressed in terms of the content of atebtrin. The most satisfactory dose was found to be two injections of 0.3 gram on successive days. Two doses of 0.1 gram were inefficient and the response to a dose of 0.2 gram was slow. It is unnecessary to give the drug intravenously; traces appear in the urine within ten minutes of an intramuscular inoculation which indicates a rate of absorption quick enough for the treatment of the gravest infection. The manufacturers recommend that the dose for intramuscular injection should be dissolved in 10 cc.

of water, but the authors found that this was rather too bulky, and they used 2.5 cc. without ill effect.

The following technique was employed in examining the urine for atebtrin; 10 cc. of urine is made alkaline with a few drops of saturated potassium carbonate, 0.25 cc. of amyl alcohol is added, and the tube is well shaken. The atebtrin is extracted by the amyl alcohol which forms a layer on the surface. By means of ultra-violet light, the typical atebtrin fluorescence can be obtained in cases where atebtrin is present in very high dilutions. Atebtrin appears in the urine a few minutes after injection and then slowly disappears over a period of weeks.

"Throughout the course of the present enquiry 421 intramuscular or intravenous injections of atebtrin musonate were given to 176 adults. In no instance were toxic effects of any significance observed which could definitely be attributed to the drug." But, it is stated in a footnote, "we have since observed the occurrence in two subsequent cases of epileptiform fits developing shortly after treatment." [The Sectional Editor has been informed that the atebtrin was given intramuscularly.] Intramuscular injections caused remarkably little pain or tenderness. In a few instances there was some induration for a day or two. *Intravenous injections were usually associated with temporary giddiness and faintness, sometimes lasting an hour or more.*

A control series was treated with quinine bihydrochloride administered orally in solution twice a day for 7 days at a dosage calculated according to body weight. In all, 286 cases of acute malaria were treated in alternating sequence with either atebtrin or quinine. The result of the comparison is stated by the authors as follows: "There was a tendency for trophozoites to disappear from the peripheral blood and for temperatures to fall to normal somewhat earlier among cases treated with atebtrin musonate It was not possible to obtain precise data regarding the permanency of cure . . . relapses after atebtrin musonate treatment are probably fairly common." Judging from the graphs given in this report, "there is very little to choose between the two drugs (especially in subtertian) with respect to their action on the parasites and the fever. W. F.

MACKAY (R.). Notes on the Cinchona Alkaloids in the Treatment of Malaria.—*East African Med. Jl.* 1936. Feb. Vol. 12. No. 11. pp. 336-341.

MARNEFFE (H.). La moustiquaire en prophylaxie antipaludique. Son application à la protection des collectivités en Indochine.—*Bull. Soc. Méd.-Chirurg. Indochine.* 1935. Nov. Vol. 13. No. 9. pp. 1264-1297. With 9 figs. [15 refs.]

PARELI (Anopheles). "Old" and New Remedies in the Treatment of Malaria.—*Bombay Med. Jl.* 1935. Oct. & Nov. Vol. 4. Nos. 10 & 11. pp. 157-168; 199-210. [15 refs.]

MISCELLANEOUS.

INGERSOLL (Winifred). **Hemoglobin Values in Normal Adults over a Period of Time.**—*Jl. Lab. & Clin. Med.* 1936. May. Vol. 21. No. 8. pp. 787-789. With 2 figs.

The main outcome of these studies is to show the absurdity of relying on single readings to decide on clinical condition by means of blood examination. The subjects were 30 young adult medical students regarded as being in excellent health and determinations were made weekly or more often from October to January. The author found that the maximum and minimum haemoglobin values varied between 0.4 and 2.7 gm. per 100 cc. Fourteen had a range up to 1.0 gm. and sixteen above this amount. The differences were greater in females, 1.54, as compared with males, 1.1 gm. Nearly half (41 per cent.) showed irregular trends, in general or in weekly values; some had a fairly constant level. A downward trend during the period was observed in about half, and in 26 per cent. was marked. *H. H. S.*

SCHARTUM-HANSEN (Hall). Ergänzung zu "Hämoglobinbestimmung durch Hämatokrit." (*Folia Haematologica*, Bd. 54, S. 22-26.) Eine leichte Methode zur Umrechnung der Thrombocytenzahl vom Plasma in Blut. [**A Simple Method of estimating the Number of Thrombocytes in Blood.**—*Folia Haematologica*. 1936. Vol. 54. No. 4. pp. 385-386.]

The author has worked out a formula for converting the thrombocyte total as found in the plasma to that present in the blood. It is based on the standard that with 100 per cent. haemoglobin one regards 5 million erythrocytes per cmm. as equivalent to 18.5 per cent. oxygen or 43 volumes per cent., and that 100 per cent. Hb=13.8 gm. per cent. He finds that the Hb percentage divided by 2.6 gives the volume per cent. and from this the formula

$$\frac{\text{Thrombocytes in plasma} \times (100 - \text{vol. per cent.})}{100}$$

gives the thrombocyte total in the blood [the *minus* sign in the numerator is erroneously given as a division sign \div in the text]. For example, a man 25 years, in apparent health, had Hb 115 per cent., plasma thrombocytes 650,000. The volume per cent. would be $115 \div 2.6$ or 44.2. Then by the formula:—

$$\frac{650,000 \times 100 - 44.2}{100} = 362,700 \text{ thrombocytes in the blood.}$$

A second example; a woman of 50 years with lymphocytic leukaemia, had Hb 32 per cent., and plasma thrombocytes 40,000. The volume per cent. is $32 \div 2.6$ or 12.3 and by the formula $\frac{40,000 \times (100 - 12.3)}{100} = 35,080$ thrombocytes in the blood. *H. H. S.*

MATSUNOBU (M.). Zum Studium der klimatischen Veränderungen der Beschaffenheit des menschlichen Blutes. (Vergleichende Untersuchungen von Erythrozyten, Viscosität, und Erythrozytensenkungsgeschwindigkeit in Sommer und Winter in Taihoku.) [**The Effect of Climatic Changes on Human Blood.**]—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1936. Apr. Vol. 35. No. 4 (373). [In Japanese pp. 906-912. German summary p. 912.]

Differences in certain constituents and properties of the blood in males and females were examined for in the hot moist climate of summer and the cold damp climate of winter in Taihoku. The erythrocyte total was estimated in 11 healthy men and 23 women in the winter, and in 10 and 23 respectively in summer, 10 of the former and 17 of the latter being the same in both seasons. He found no difference. [Unfortunately the Hb estimations are not mentioned; they would be interesting in view of the variations found by Winifred INGERSOLL, above.] The reticulocytes were found to be a little less, 0.14 per cent. less on an average in summer; also the viscosity. The red cell sedimentation rate showed greater changes: of 10 men and 18 women tested at both seasons the former showed an increase of 1.73 mm. and the latter 2.45 mm. in summer. The author concludes that in the moist hot summer there is a diminution in the erythrocyto-poietic functions. [The number of examinations carried out during the different seasons is not stated; if only one in each the results could be of much less value than if the figure given represents the average of several.]
H. H. S.

GIGLIOLI (George). **Megalocytic Anaemia of East Indians in British Guiana.**—*British Guiana Rep. Surgeon-General for Year 1934*. Appendix II. (B). pp. 94-110. [16 refs.]

The object of this Report is to draw attention to the high incidence of megalocytic anaemia among East Indians of British Guiana, where the disease influences considerably the maternal, foetal and infant morbidity and mortality. Negroes, aborigines and people of mixed races were not affected. Frequently multipara gave a history of similar anaemia during the previous pregnancies which had often terminated with abortion or miscarriage or the delivery of a still-born or sickly infant which did not survive. The ratio of female to male cases was as 5.5 : 1.0, and the ages ranged from 11 months to 44 years. Only 6 cases were seen in children below 12 years. The greatest incidence occurred in adults between the ages of 17 and 30. Of the 38 adult women affected, 35 were expectant mothers or had recently been delivered.

Clinical features.—The onset was generally gradual. Symptoms included lassitude, progressive weakness, palpitation, dyspnoea and vertigo. Soreness of the tongue and mouth, anorexia, dyspepsia and epigastric discomfort after meals were not infrequent. The complexion was muddy with a yellowish tinge, the mucous membranes were pale and the sclerotics subicteric or frankly jaundiced. In 28 out of the 45 adult cases there was fever. Splenomegaly, attributed to malaria, was present in 47 of 50 cases. The stools were bilious, yellow or dark green. Cardiovascular disturbances including dyspnoea, palpitation, vertigo and haemic murmurs were noted. The urine was high coloured and diminished in quantity with transitory albuminuria in 12 out of 51

cases. The nervous system was not involved. Relapses and remissions were a not infrequent feature of the disease.

Haematological findings.—The red cell count varied from 800,000 to 3,700,000 cells per cmm. The haemoglobin percentage ranged from 25 to 40 per cent. (Hellige haemometer). The colour index varied in 7 instances from 1.0 to 1.6, and in 11 from 0.8 to 1.0; in 20 it was below 0.8. The lowest figure reported was 0.55. In severe cases it was practically always high. Had the Haldane scale been adopted a larger proportion of cases would have shown a higher colour index, since an 80 per cent. Hellige corresponds to a 100 per cent. Haldane. The reticulocyte count was frequently high and in 34 cases the author points out that the effect of malaria could not be excluded. For the estimation of cell diameters Eve's haemometer was used. In 45 patients the average red cell diameter varied from 7.8 to 8.39 microns. The white cell counts generally revealed leucopenia ranging from 3,000 to 5,000 leucocytes per cmm. The serum bilirubin was increased; 23 out of 31 cases gave a positive Fouchet reaction. The indirect van den Bergh was positive in 39 cases, the readings varying from 2 to 16 units. Only in 2 cases was the reaction negative; 3 gave a very faint delayed positive reaction.

Treatment.—With a few exceptions, all the patients suffered from malaria, so that a 10 days' course of quinine, gr. 10 twice daily, was given as a routine in both pregnant and non-pregnant cases. Sepsis and intercurrent diseases, such as ankylostomiasis and syphilis, were also treated. Hydrochloric acid was prescribed for dyspepsia. Fresh, raw, or cooked liver or liver extract given by the oral or parenteral route, was utilized. Campolon was injected daily (2 cc.) or larger amounts were given at intervals, *i.e.*, 5 cc. every 4 days. In mild or convalescent cases the interval was increased to 6, 8 or 10 days. Marmite was given in a dosage of 2 drachms by weight twice daily in water, milk or food. Its action was not quite so prompt as the liver extract injections. Marmite was cheaper, but owing to its high salt content required much fluid diluent, and in grave cases with impaired gastric function and vomiting it was not well tolerated. The diet adopted was light and nutritious, and as soon as possible eggs and milk were included. Bulky carbohydrates were avoided. A reticulocyte reaction was noted about the fifth day following marmite and liver extract therapy. As soon as the uterus was emptied, whether by abortion, miscarriage or delivery at full term, recovery followed at a surprisingly rapid rate in the vast majority of pregnant cases. In most patients it took 3 to 4 weeks after delivery for recovery to ensue.

[The author states that this form of megalocytic anaemia, though similar to tropical megalocytic anaemia of India and Africa, differed in that practically all cases gave a positive indirect van den Bergh reaction and in this respect resembled the megalocytic anaemia of pregnancy occurring in temperate climates. Considering, however, that "the effects of malaria could not be excluded in 34 cases of the series," and that "with few exceptions all cases suffered from malaria," this observation loses much of its significance. The problem was also involved by the presence of other intercurrent diseases such as ankylostomiasis (14 per cent.), syphilis (14 per cent.) and sepsis. The incidence of acid secretion in the stomach was not determined nor was it possible for the author, under the circumstances of the investigation, to use more accurate and elaborate methods such as the Price-Jones' curves or volume index in determining the megalocytic nature of the anaemia, or

to examine the marrow obtained by sternal puncture. Despite its inevitable limitations from a haematological viewpoint, the investigation is a valuable contribution and the subject one well worthy of more detailed study.]

N. Hamilton Fairley.

NAPIER (L. Everard) & DAS GUPTA (C. R.). **Haematological Studies in Indians. Part V. Red Blood Cell Measurements. With Note by K. C. K. E. RAJA.**—*Indian Jl. Med. Res.* 1936. Apr. Vol. 23. No. 4. pp. 973-992. With 2 figs. [16 refs.]

This article will well repay careful study. The authors discuss without bias the various methods in use for determining red cell measurements—the halometer, the method of Price-Jones, the variations due to the distance of the cells from the centre of the film, variations in different parts of the film; the packed-cell method of estimating cell volume and a consideration of the “normal” volume in Indians and in “normal” Assam tea-garden coolies [*ante*, p. 75]. They maintain that the halometric method is fraught with possible errors; so much so as to be of no practical value. The Price-Jones’ method is accurate and therefore valuable, but is very laborious. They suggest a means of lessening this, but conclude that it is not altogether practical. The packed-cell method of the authors utilizes 0.2 per cent. potassium oxalate as an anti-coagulant, and as a result of controls with hirudin or heparin they adopt Wintrobe’s procedure of multiplying the cell-volume readings by the factor 1.09 and accept his figure of 8.2 per cent. Examination of the cell-volume, total red corpuscles and the haemoglobin in grams per 100 cc. of the blood of 30 city-dwelling male Indians in apparent good health and of 34 Assam tea-garden coolies who had recovered from anaemia has shown that the mean corpuscular volume of the former is higher than British and American standards while the mean concentration of Hb is lower; among the Assam coolies the cell-volume was low. The authors conclude that the packed-cell method supplies practically all the required information:—

“The fallacies, other than those connected with inaccuracies in the graduation of the tubes, are due to the shrinkage of the cells on addition of the anti-coagulant and to the speed of the centrifuge; the former can be overcome by using a constant quantity of oxalate and multiplying the reading by a factor, and by using the same centrifuge at the same speed for all one’s estimations, both in normals and in anaemic patients, errors due to the latter can be reduced to a minimum. The question of the effect of speed of centrifugalization seems to require further investigation.”

H. H. S.

PAI (H. C.). **The Polynuclear Count in Health and Disease and its Significance in China.**—*Chinese Med. Jl.* 1936. Feb. Supp. No. 1. pp. 13-20.

The following as determined by W. E. COOKE may be taken as representing the average Arneth count of healthy subjects in Britain. I 10, II 25, III 47, IV 16, V 2. It varies, of course, but speaking generally a percentage over 40 in I and II together was regarded by him as abnormal. The author studied the condition in apparently normal Chinese in Mukden (Manchuria) and found the average standard to be I 26.7, II 43.7, III 25.4, IV 4.0, V 0.2, *i.e.*, I and II together 70.4. In septic affections the shift to the left was much greater than in the case

of British at home. Thus in acute appendicitis, osteomyelitis, acute tonsillitis I and II made up 97-99 per cent., in scarlet fever and uncomplicated measles 100, uncomplicated whooping cough 91, in the two last with broncho-pneumonia 99 and 97.5 per cent. respectively.

The author has found the I and II percentage and changes in it of value in diagnosis and prognosis; in the former case particularly where an expected leucocytosis is not present. Thus, he records the case of a man with chills and fever; Widal negative, blood culture negative, no plasmodia, no physical signs. Leucocytes on two occasions totalled 5,937 and 7,500, with 73-75 per cent. polymorphonuclears. On a third occasion, they totalled 6,600, but an Arneth count gave I and II 99 per cent. Antrum suppuration was found. In prognosis, the value of this percentage is exhibited by two instances. The first a man with peritonitis the result of perforated inflamed appendix. For nearly a week the figure remained 90-96, and then followed a steady shift to the right, 79, 73.5 four days later, and 62 in another three weeks; the patient recovered. The second was a case of streptococcal septicaemia; the figures on the first 3 counts at weekly intervals were 99, 98, 89, but after that a return movement to the left took place and 9 days later was 100 and soon afterwards death occurred.

Considering the above findings we may say that the healthy Chinese in Mukden shows a marked shift to the left as compared with the British at home. It would appear to be not a *racial* difference, but rather domiciliary, as the following indicates, where the Chinese in Britain has a lowered figure, returning to the higher "normal" on return to Mukden.

Nationality	Place	Duration of residence	I	II	III	IV	V	I & II
British	Britain	—	10.0	25.0	47.0	16.0	2.0	35.0
"	Mukden	Over a year ...	32.6	41.2	23.0	3.1	0.1	73.8
Chinese	"	Over 10 years	33.5	46.0	18.25	2.25	0.0	79.5
"	Britain	Two months						
"	"	after arrival	12.0	30.0	44.0	12.4	1.6	42.0
"	Mukden	One month after return	27.5	46.0	24.0	2.5	0.0	73.5

BANNERJEE from estimations on Indians in Bengal, BREINL and PRIESTLY on Australian children and New Guinea natives, and KENNEDY on natives in Iraq attribute the shift to the left to climatic influence or infections, active or latent. It was found, however, even in subjects in apparent good health, and might be due, at least in part, to environmental factors, high temperature and powerful sunlight. Again, in tropical and subtropical countries the length of life of leucocytes may be shortened, "perishing in middle age," and thus the one- and two-lobed cells would predominate. Why this is so we do not at present know, "but some factor must be at work in Mukden which causes the neutrophil leucocytes to leave the circulating blood much sooner than in Britain, so that relatively few older cells are present." Possibly, as the author suggests:—

"The extreme cold in winter, heat in summer, the strong sun-light, the dusty and dry atmosphere in winter and early spring may in some

way affect the leucocytes and shorten their life, say by rapid passage through the mucous membrane of the upper respiratory tract. In order to determine which of these factors may influence the longevity of the leucocytes, counts of normal individuals at different seasons of the year are being made now."

[Altogether an interesting study and opening up an interesting field of research. See also this *Bulletin*, ante, p. 78.] H. H. S.

TSCHERKES (L. A.), LITVACK (J. I.) & KOROVITZKY (L. K.). **Sensitivity to Adrenalin in Pellagrins.**—*Acta Med. Scandinavica*. 1936. Vol. 87. No. 5-6. pp. 459-469. [15 refs.]

Attention has been called on several occasions to the similarity existing between the symptoms of pellagra and those of Addison's disease, namely, the disturbances of pigmentation, alimentary dysfunction, anaemia, hypotension, adynamia and asthenia, indicative of dysfunction of the chromaffin system.

The authors have carried out experimental work on man "with a view to establishing in what degree such changes are reflected in the perversion of the reaction of pellagrins to adrenalin." They record here the results in 8 patients. The blood pressure and pulse rate having been ascertained, the patient received, fasting, 100 gm. of sugar dissolved in 300 cc. water and 10-12 minutes later 1 cc. of adrenalin (1 in 1,000) was injected intramuscularly. Thereafter, every 10-15 minutes for an hour the blood pressure, the pulse rate and the state of the pupils were recorded and the sugar content of the urine after 2, 4 and 6 hours. Six of the patients were suffering from acute pellagra and two with a mild form of it. The detailed findings are recorded for each patient, but the results may be summarized as follows: In pronounced cases of the disease there was practically no reaction to the adrenalin, the pulse rate and blood pressure remained almost unchanged, there was no dilatation of the pupils and there was no glycosuria in the time of the experiment, up to 6 hours. In cases of average or slight severity the reaction might be small or absent. Yeast was then given and as the symptoms of pellagra cleared so an increase in the patient's sensitivity to adrenalin was seen.

"All these facts prove that pellagrins suffer from a distinct decrease of the tonus of the sympathetic nervous system, and of the chromaffin system; they tally well with those clinical symptoms of Addisonism and histopathological disturbances . . . mentioned. . . . The accumulation of further material is requisite for wider generalizations, in which material special attention should be paid to . . . the restoration of sensitivity to adrenalin in proportion to the disappearance of pellagra—a fact which should be borne in mind for the proper interpretation of the pathogenesis of pellagra and for the definition of the effectiveness of therapy." H. H. S.

NOOSTEN (H. H.) & VISSER (J.). Over de vergiftige eigenschappen van den "Reunghas" (een klinische en experimenteele studie van een blaartrekkende substantie). [**Reunghas Poisoning.**]—*Geneesk. Tijdschr. v. Nederl. Indië*. 1936. June. Vol. 76. No. 22. pp. 1346-1404. With 6 figs. & 6 plates. [21 refs.] English summary.

The sub-title of this article is "a clinical and experimental study of a vesicating substance" The researches detailed were undertaken on

account of a patient admitted to the Mission Hospital, Bandung, suffering from extensive dermatitis after contact with the renghas tree—*Gluta renghas* Linn.—which grows near water, and *Semecarpus heterophylla* Bl. often found in cemeteries. The latter was the subject of experiment. Milky juice, obtained by incising the fruit or the bark, produced on contact with the shaven skin of guineapigs or rabbits a local inflammation, sometimes healing in 4 days, at others setting up a dermatitis, persisting, with exudation and necrosis, for weeks. Fresh leaves could be eaten with impunity, and a watery extract of the fruit and other parts, or the vapour from burning the wood were harmless. An extract of the fruit or wood prepared by the Stass-Otto process proved to be very irritant. A drop placed on the shaven skin of guinea-pig, rabbit, or monkey caused hyperaemia, inflammation, exudation and necrosis, lasting for 10 days to several weeks. In the eye it caused severe inflammation and ultimate destruction of the organ. Strange to say, by mouth, intravenously or subcutaneously, no general symptoms resulted. An emulsion obtained by mixing the extract with water was innocuous when applied to the skin, but in ether, in a strength of 1 per cent., it caused inflammation and swelling.

In human beings the extract caused, as in animals, local necrotizing inflammation sometimes extending widely and involving other parts of the body, causing itching and vesication. Possibly, these differences are due to varying susceptibility, or to allergy. Further study is to be taken in hand [see also this *Bulletin*, ante, p. 81]. H. H. S.

DIERICK (J. E. A. M.). *Myiasis intestinalis*.—*Nederl. Tijdschr. v. Geneesk.* 1935. Dec. 21. Vol. 79. No. 51. pp. 5866–5867. With 1 fig. In Dutch. French summary (3 lines).

The case is recorded of a pregnant woman of 26 years vomiting larvae of *Homalomyia canicularis*. The author states that he is unable to conjecture how they came there; the woman was cleanly, had no sores, and had not eaten any tainted meat, nor for several days any raw vegetables.

H. H. S.

CORRADETTI (Augusto). Alcune ricerche sull'*Anopheles maculipennis*. [Notes on *Anopheles maculipennis* in Italy.]—*Riv. di Malariaologia*. Sez. I. 1936. Vol. 15. No. 2. pp. 106–113. With 1 fig. English summary.

The author presents notes on several points which he has observed in studying *Anopheles maculipennis* in Italy.

The first note describes what appears to be an abnormality in the structure of the shell of the egg of *Anopheles maculipennis labranchiae*. The author failed to find any difference in larval structure or in biology between normal *labranchiae* and those raised from these eggs: the adults were evidently stenogamous (the word "eurygamous" being used apparently as a misprint).

The other notes refer to points of biology. It is found that adults of *labranchiae* bred from the egg are much more willing to feed in the laboratory than adults of other races, and this is irrespective of whether they are given an opportunity of biting man or guinea-pig, about 80 per cent. feeding on either. Adult *atroparvus* fall into an intermediate group, 40–60 per cent. of them feeding on either of the above hosts. Under similar circumstances less than 10 per cent. of adult *typicus* and

melanoön take blood. It is interesting to see that under the particular conditions of the experiment no evidence of "zoophilism" was obtained.

The author then passes on to statistics of the sex ratio in *labranchiae* bred at different times of the year. His figures appear to indicate that there is no change in sex ratio with season, and that the number of males emerging is generally a little less than the number of females, the percentage of males in the whole experiment (about 4,000 mosquitoes) being 47.81. One would perhaps have expected that the proportion of males would be a little above 50 per cent., assuming that the sexes were in equal proportions in the egg: for it is shown that the males emerge about a day before the females, so that any cause of mortality in the early stages would tend to reduce the proportion of females, because they are at risk for a longer period. P. A. Buxton.

SHUTE (P. G.). **A Study of Laboratory-bred *Anopheles maculipennis* var. *atroparvus*, with Special Reference to Egg-Laying.**—*Ann. Trop. Med. & Parasit.* 1936. Apr. 8. Vol. 30. No. 1. pp. 11–16.

The author presents detailed studies on the biology of the female *Anopheles maculipennis* var. *atroparvus*, giving particular attention to the number of batches of eggs laid and the length of the insect's life.

The mosquitoes have been bred uninterruptedly in the laboratory at 75°F. for about two years. The author's method is to put a number of newly emerged males and females together for 24 hours. The males are then removed and the females fed. As each female shows signs of developing eggs she is isolated until oviposition has occurred. She is then fed and again isolated, it being found that nearly always a single meal of blood is sufficient to produce a batch of eggs. The author has had remarkable success in keeping the insects alive, for about half the females lay 4 batches of eggs and a small percentage of females lay 12 to 17 batches; one of these exceptional females produced in all about 2,500 eggs over a period of 60 to 80 days. In spite of the fact that the females are given only the one opportunity of pairing the fertility of the eggs remains undiminished to the end of the series of ovipositions. The opinion is expressed that though the experiments were carried out in a very uniform way there are differences in the rate of survival in experiments carried out at different times of year, but the figures quoted do not appear to lend much support to this view.

P. A. B.

STAGE (H. H.). **Mosquito-Control Activities in the Pacific Northwest under the CWA Program.**—*Jl. Econom. Entom.* 1935. Dec. Vol. 28. No. 6. pp. 1022–1024.

The interest of this account lies in the fact that three different types of anti-mosquito measures were needed to deal with the species concerned. In the thickly matted jungles of willow brush along the Columbia and Willamette Rivers in Multnomah and Columbia Counties, Oregon, and in Skamania and Clark Counties, Washington, flood-water mosquitoes, *Aedes vexans* and *A. aldrichi*, occur in hordes in summer; their reduction was effected by clearing their breeding grounds of the willow brush, by ditching poorly drained areas and dyking against high water. In the salt-water marsh in Tillamook County, Oregon, *Aedes dorsalis* breeds in numerous pot-holes between high tides. Under the CWA (Civil Works Administration), elimination was attained by

connecting the pot-holes by ditches to the main channel, whereby the high tides flushed and drained out the breeding places. The third was carried out on the northern end of Bainbridge Island, in Puget Sound. This is a summer resort within easy distance of Seattle. There are many springs and the rugged nature of the district formed depressions where seepage and rain collected and *Aedes aboriginis* and *A. fitchii* bred abundantly. Pools and seepage were eliminated as far as possible by ditching watercourses to the Sound and where this was impracticable the sites were cleared so that the pools could be oiled without difficulty.

H. H. S.

ESCOMEL (Edmundo) & CHAVES VELANDO (L. A.). Un nuevo Pthyrus parásito de las pestañas del hombre. [**New Species of Louse Parasitic on the Eyelashes of Man.**—*Crónica Méd.* 1935. Sept. Vol. 52. No. 867. pp. 335-339. With 2 figs.

In 1930 Dr. Chaves Velando observed a case of blepharitis, a child of 2 years, with lice attached to the eyelashes. He regarded them as *Phthirus pubis* transferred to the new site. In 1934 he saw a case in a man of 35 years with obstinate blepharitis, and found many lice and their eggs attached to the hairs of the upper right eyelid, and since then another child of 2 years has been seen by him. In all there were congestion and oedema of the upper lid and a blackish powder on the lower—the excreta of the lice. The authors present in tabular form the comparisons between *Phthirus pubis* and this which they call *P. chavesi*, from which it is seen that the latter is smaller in all dimensions and of a lighter colour.

H. H. S.

REVIEWS AND NOTICES.

GRUNSKÉ (Friedrich). **Tätigkeit und Ergebnisse der Malaria-Untersuchungsstation in Emden (Ostfriesland) von 1910-1933. Aktenmäßige Darstellung einer 24 jährigen Malariabekämpfung in einem deutschen Marschlande.** [Work and Results of the Station for the Investigation of Malaria in Emden (1910-1933).]—*Veroff. aus dem Gebiete des Marine-Sanitätswesens.* 1936. Heft 27. 180 pp. With 6 figs. & 1 folding map. [58 refs.] [7 Rm.]

In this Report a detailed account is given of the activities of the malaria station in Emden, in East Friesland. The district is flat and marshy, intersected by numerous ditches, dykes and canals, and with many ponds and lakes, mostly at and below sea-level. In the past the area has been liable to frequent flooding, but latterly pumps have been installed to prevent this. The district is situated on the eastern side of the estuary of the river Ems, which separates it from Holland; on the north it is bounded by the North Sea. The urban area of Emden is about 29 square kilometres, and the population about 30,000, much of the latter being contained in the suburbs of Transvaal and Port Arthur. The extent of the rural area, in which the malaria station works, is about 340 square kilometres, with a population of about 25,000.

Malaria has been endemic in East Friesland, and especially in the Emden district, for centuries. In the past, there have been many widespread epidemics, some of which were very severe. From the year 1880 onward, a decided improvement occurred in the prevalence of malaria; this took place coincidentally with the partial drainage of the swampy surroundings. In 1908 there were again many cases; it became necessary to adopt systematic measures to cope with the disease, and the malaria station was opened in March 1910. Since that date there have been several years in which malaria was again very prevalent; the worst period was from 1917 to 1920. After that, the number of cases fluctuated year by year; the highest number occurred in 1926, after which there was a gradual fall, reaching a minimum in 1929 and 1932, but there were rises in 1930, 1931 and especially in 1933.

The work of the malaria station consists in the methodical search for cases of the disease, accurate diagnosis by blood-examination, lectures and publication of explanatory and educational pamphlets, and other forms of propaganda. At first the station also undertook the treatment of malaria cases with quinine, and the patients were visited frequently by some of the staff, or by nurses, to make sure that the treatment was being carried out properly. As far as possible, patients were encouraged to seek treatment from the local doctors, though none was refused treatment by the malaria station, and the treatment was free. The doctors were asked to notify to the station all cases of malaria that they saw in their practice, and every attempt was made to obtain their co-operation. Unfortunately the work of the station was not welcomed by many of these practitioners, who were not at all diligent in reporting cases. The chief reason for this aloofness seems to have been resentment of the fact that the station undertook free treatment of persons in whose blood malaria parasites had been found; but even when the station discontinued this practice, in 1928, and confined its activities to diagnosis, mosquito control, and other general anti-malarial measures, the doctors maintained an attitude of some reserve, which, however, has lessened of late years.

There was also, for a long time, a certain amount of apathy, and even opposition, to the acceptance of treatment on the part of the inhabitants, and this was not entirely confined to the less educated. Many of the people were in the habit of carrying out their own treatment with quinine, which they took in sufficient quantities to stop, at least temporarily, the attacks of fever; but the treatment was not at all systematic, nor thorough enough to render them free from infection. It was, and still is, impossible to induce most of those who have had an attack of malaria to submit to frequent examination after they have once lost the fever, or to persuade them to continue the prescribed course of treatment. Naturally it was easier to ensure continuous treatment and adequate examination of the school-children; few carriers were found among the children, and it seems that the majority of carriers are adults. With one exception (an infant who had quartan fever) all the cases examined had benign tertian fever; a few imported cases of malignant tertian were seen, but this form of malaria did not spread.

As a result of the general rise in the prices of commodities after the war, treatment with quinine became very expensive, and there was some fear that the malaria station would have to be closed; fortunately this was not found necessary, but its activities were considerably restricted.

Until 1919 only spasmodic and limited attempts were made to deal with the breeding places of mosquitoes, the work was hampered by scarcity of labour and financial stringency. A few small swamps were filled up, and others treated with oil; hibernating mosquitoes in rooms and cellars were destroyed by flame-projectors and insecticide sprays, but the work could not be done very thoroughly on account of the expense, and the operations were opposed by many of the people whose houses it was hoped to free from the insects. More progress was made in 1920 and subsequent years, but hibernating *Anopheles* mosquitoes were often found in dwelling-houses in very large numbers.

Besides *Anopheles maculipennis*, *A. bifurcatus* also occurs in East Friesland, but in too small numbers to play any important rôle in the spread of malaria.

Professor E. MARTINI has described three races of *A. maculipennis* in Germany, which are distinguishable from one another by the markings and colour of the eggs, and some other morphological features of the adults; the differences are especially marked by physiological and ecological characters. In large lakes and rivers, the race *messeae* is prevalent; *typicus* is seldom found with the other two, and only in a few localities, where there is cold spring-water. The commonest race, and almost the only one in the Emden district, is *atroparvus*, which is found along the whole seacoast from Emden to Danzig, and also inland, where brackish and saline water occurs. In Emden, among 700 specimens, only 30 belonged to the *messeae* variety, all the others being *atroparvus*; *typicus* was not found at all. Although *atroparvus* is the mosquito concerned with the existence of malaria in Emden, it cannot be considered a particularly dangerous race, since it frequents long stretches of the German coast, and also inland places, where no malaria occurs. Indeed it is more zoophilic than anthropophilic, though it is not at all averse to biting human beings. It passes the winter chiefly in cattle sheds and pigsties, where the temperature is sufficiently high to enable the plasmodium to carry on its development, and to induce the mosquito to feed occasionally.

In Emden it was found that several cases of malaria usually occurred in the same family ; it was comparatively rare for a single member to be attacked. No doubt this is due to one or more persons acting as carriers, from whom the other members of the family derive their infection. For the same reason, the neighbours often became infected, and so small foci of malaria are formed.

During the 23 years dealt with in the report, the blood of 170 babies under one year was examined for malaria ; of these 57 gave positive results, the youngest infected infant being 10 weeks old. Although the disease is not common in old people, a woman aged 90, and a man aged 99, were found to have malaria.

In 1933, the last year of the period covered by the report, the blood of 751 persons was examined ; malaria parasites were found in 178 of these (23·7 per cent.) ; it is evident therefore that, although it is less prevalent than in many former years, endemic malaria is very far from being stamped out in the Emden district.

Dr. Friedrich GRUNSKE's account of the endemic malaria in Emden invites comparison with the history of malaria in similar districts in England. The conditions in Romney Marsh, the Isle of Grain and some other places, are not at all unlike those described by him in East Friesland, though the areas concerned are much smaller. On Romney Marsh *Anopheles maculipennis* is extremely plentiful, and many suitable breeding places exist, in spite of an extensive system of artificial drainage. In the autumn and winter the insects can be found in immense numbers in some of the older cow byres, stables, pigsties, rabbit hutches and similar places ; that they are not indisposed to bite man is shown by the fact that many people in these districts use mosquito nets. It is impossible to believe that the mosquitoes have no opportunities of becoming carriers of malaria ; within easy distance of Romney Marsh and the Isle of Grain, there are barracks and occasional concentrations of soldiers, many of whom have certainly been abroad, and of these it is very probable that some are carriers. Moreover, endemic malaria does occur in both places, though the number of cases is very small. Formerly these districts were notoriously malarious : why has malaria practically died out ? It is usual to attribute this to such factors as a higher standard of living, better housing and improved general sanitation ; doubtless these are largely responsible for the almost complete extinction of the disease. But there is also another change in the local conditions, which is of considerable importance, and which is liable to be overlooked. This is the great improvement that has taken place in the housing of cattle and other animals. The race of *Anopheles maculipennis* that is found on Romney Marsh, like that in the Emden district, is decidedly zoophilic. If it is desired to find mosquitoes, it is of little use to seek for them in the light and airy modern cow sheds, provided as these are with free ventilation, drainage, clean whitewashed walls and tiled roofs ; very few mosquitoes will be found in these. But there still exist, on some of the farms, old-fashioned, dark, damp and stuffy byres and stables ; in such places *Anopheles* mosquitoes abound, as the conditions suit them admirably. Dr. GRUNSKE refers to the many animals, cows, pigs and goats, kept in close proximity to the houses of many of the inhabitants of the Emden district and it seems likely that further improvement in the amount of malaria would occur, if attention were given to the housing of domestic animals. This would probably have more effect in diminishing the number of mosquitoes than attempts to do away

with the breeding places, since, from the nature of the country, this can only be done partially ; and, unless all the breeding places over a very wide area can be abolished, no very decided diminution can be attained.

The general lines of successful antimalarial operations are well known by now ; Dr. GRUNSKÉ has done good service in drawing attention to the practical difficulties that may be met with, when an attempt is made to carry them out, and his very interesting report is of much wider application than to Germany alone.

H. J. Walton.

VELLARD (J.). *Le venin des araignées*. [Spider Venoms.] Préface du Professeur Caullery.—311 pp. With 63 figs. Monographies de l'Institut Pasteur. 1936. Paris : Masson et Cie, 120, Boulevard Saint-Germain. [45 fr.]

It has been known for many years that the bites of spiders of the genera *Lactrodectus* and *Glyptocranium* often have serious consequences for man and domestic animals, especially in Italy and Southern Russia ; of late, other spiders have been incriminated in North and South America, Madagascar, Australia, New Zealand, and, to a less extent, in the countries bordering the Mediterranean. Dr. Vellard has now considerably extended the list of dangerous spiders : he has had exceptional opportunities for the investigation of araneism, as he has worked at the Butantan Institute (São Paulo) for several years, and has travelled in other parts of South America, where spiders of many families are particularly common and much feared. Moreover, he is a naturalist, as well as an experienced experimenter, and he has devoted special attention to the identification of South American spiders, their habits and venoms.

In this book so many interesting and important facts are recorded that it is impossible, within the limits of a review, to do more than allude to a few of them ; the whole book well repays careful study.

The results of the bite of a spider are often unrecognized as such. In Brazil the very serious nervous symptoms caused by several species of *Ctenus* have been mistaken for tetanus, and the ulcerations caused by *Lycosa* have been regarded as cases of leishmaniasis or as tropical phagedaenic ulcers.

Some of the negative results recorded in experiments with spider venom may be due to the fact that a spider may bite without injecting any venom, although there is plenty in the poison glands ; of this fact the author gives a good example. Many spiders show marked specialization in their venom, which is much more toxic for the spider's habitual prey (particular groups of insects, aquatic animals, lizards, etc.) than for other animals.

Some observers have found spider venom to be acid, and others alkaline. To settle this matter, Dr. Vellard examined a large number of spiders ; he found that the venom of the same spider is sometimes acid and sometimes alkaline. The species, age, sex, and state of activity of the reproductive organs have no influence on the reaction ; prolonged fasting tends to acidify the venom. But the chief factor concerned is the atmospheric temperature ; at Rio de Janeiro, for instance, almost all the spider venoms are alkaline during the warm season ; in the cool season the reaction is often acid. In a lesser degree there is the same variation in the reaction of the haemolymph. Normally this is alkaline, but in cold weather it may become neutral

or slightly acid; sometimes the venom is acid, and the haemolymph alkaline.

The venoms which possess the property of producing gangrene are much more numerous than those which are purely neurotropic; the author gives several photographs of the lesions caused by the bite of *Lycosa raptoria*, which show extensive sloughing and ulceration of the skin over wide areas.

Haemolysins have not been found in spider venom, but are obtained from the body and eggs of several spiders, whose bite is relatively harmless; they cannot be obtained from all spiders, nor, at all seasons, from the same spider. Their presence is intimately associated with the reproductive activities of the female; they are not found in male spiders, nor in the female unless fecundated. Haemolysins appear with the development of the eggs and disappear when these have been laid; they are also found in the eggs and in very young spiders. Antigens may be produced by suitable injections into animals, but antisera prepared in this way are specific, and do not protect against the venom of the same spider; the converse is also true.

The haemolymph of spiders is toxic, and this toxicity is constant and independent of sex, reproductive activity, or the acidity or alkalinity of the fluid. The symptoms produced in animals by the injection of the haemolymph are very uniform in the case of all the species studied by Dr. Vellard; when given intravenously it produces almost immediate dyspnoea, followed soon by apnoea, a few convulsions, and death.

More than half of the book is occupied by a systematic account of the different families of spiders met with in South America, their venom, and its mode of action, with many clinical reports of cases of spider bites in man. This is, perhaps, the most important part of Dr. Vellard's book, and it will long remain a valuable record of his work.

In the third part of the book descriptions are given of the methods of treatment of spider bites and the preparation of antisera. These antisera are highly specific, and it is unfortunate that, in so many cases, the spider is not identified, a fact which limits the use of the serum.

Dr. Vellard's monograph bears abundant evidence of his industry and enthusiasm, and it is written in the easy and attractive style that is so often associated with the best French scientific literature.

H. J. Walton.

GHOSH (Birendra Nath) [F.R.F.P. & S. (Glas.), etc.]. **A Treatise on Materia Medica and Therapeutics including Pharmacy, Dispensing, Pharmacology and Administration of Drugs.** 14th Edition.—pp. xv+724. With 13 figs. 1936. Calcutta; Hilton & Co. and London: H. K. Lewis & Co., Ltd. [Rs. 7 As. 8 or 12s. 6d.]

Only three years have elapsed since the preceding edition of this work was published—proof that the book still fulfils its mission. This new issue is, nevertheless, a great improvement on the last; fairly extensive revisions have been carried out, notably in sections dealing with anaesthetics, narcotics, quinine and the vitamins; accounts of others have been introduced, notably dilauidide, dicodide, evipan, percarine, coramine, carbarsone, vioform and antivenenes; slight rearrangement of the matter is also, we think, an advantage, in particular transference of the section on Pharmacy and Dispensing to the end. A very

valuable section is that dealing with incompatibility, for it is astonishing to those medical men trained some 30 years ago or more to find how little the modern student knows of this subject. Dispensing having to a great extent gone out of fashion for the general practitioner, he does not realize how nauseating are some of the mixtures he prescribes, and how he inadvertently may prescribe some explosive or poisonous mixture. The tablet and patent medicine manufacturer has certainly saved the busy practitioner a lot of time and trouble, but at the same time he is largely responsible for the widespread ignorance of dispensing and pharmacology exhibited by the more recently qualified medical man.

Among the new additions it is surprising to find no mention of venoms as haemostatics, especially as they have proved their value and the literature during the past year is fairly extensive. Misprints are few, we note that *histolytica* is still wrongly spelt. The list of "contractions of phrases used in prescriptions" needs revision; does anyone nowadays write *omni bihora* for "every two hours," and even Smith minor would be rightly caned for "Ante cibus," "post cibus," "in pilulae xii divide." The format of the book is much improved by a larger page and clearer type.

H. H. S.

SABADINI (L.). *Les kystes hydatiques de la rate.* [Hydatid Cysts of the Spleen.] Préface du Professeur Costantini.—200 pp. With 82 figs. 1936. Paris: Masson & Cie, 120 Boulevard Saint-Germain. [32 francs.]

Hydatid cysts of the spleen are rare, constituting between 2 and 3 per cent. of all hydatids, according to the records of most authors. Nevertheless the spleen comes third in the list of individual organs invaded, though a long way behind the liver, which of course heads the list, with some 75 per cent., the lung coming next with 10 per cent. Partly, perhaps, on account of its rarity, partly by reason of its surgical importance, there is a considerable literature dealing with the condition. The bibliography appended to this book names nearly 300 references.

After a few short remarks on the prevalence and history the author describes in a few pages the pathogeny of primary and secondary involvement of the spleen by hydatid. The chapter on the pathological anatomy which succeeds this is fuller and of much interest and is illustrated by a number of explanatory diagrams mostly from Professor DÉVÉ's work. The clinical section, as would be expected, is not a long one, for after all there is not much to be said on the clinical aspect. As regards diagnosis, beyond the physical signs, mention is made of Casani's test and complement fixation. Two chapters, the fullest and rightly so, are devoted to treatment and the details of operative procedure; this is abundantly and clearly illustrated. Finally, there is a chapter of "observations." This consists of brief accounts of patients, some under the author's care, others culled from the literature, together with remarks upon certain of the cases.

The monograph summarizes the literature and present knowledge of the subject and should prove a useful work of reference both for the general practising clinician and the surgeon.

H. H. S.

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PELLAGRA AND PELLAGRA-LIKE CONDITIONS IN WARM CLIMATES.

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SECTION II.*

In the section which will follow it is proposed to discuss a number of conditions, having many features in common with pellagra, which have been the subject of communications, some in recent years, others many decades ago. To some of these, as possible examples of atypical pellagra, attention has been called on a previous occasion (H. S. STANNUS, 1930). In the next section this argument will be pressed further. These several conditions, occurring in native races in different parts of the world, at first sight may appear very varied, though in more recent cases those who have recorded their observations have sought to explain them all on a basis of unbalanced dietaries.

In studying these various communications, in many of which the authors have been at pains to give a differential diagnosis from pellagra, I have been struck by what would appear to be a failure to appreciate many of the facts about that disease. It is given to few medical men to have the opportunity of studying pellagra. The abridged accounts of the disease which appear in text-books are, many of them, based on the observations of the last century, and contain many statements which are calculated to give a wrong impression of the affection, while, at the same time, many facts of importance are omitted. In this section it is, therefore, my intention to discuss the symptomatology of pellagra with a view to clearing up some points about which there has been a good deal of misconception.

H. F. HARRIS (in 1919) wrote: "It is unquestionably true that the name given to this disease and the striking character of the dermal symptoms have resulted in these manifestations being accorded an undue and wholly unjustifiable prominence in the minds of many who have written on the subject" "All practical pellagrolgists

* Section I appeared in the October issue (pp. 729-741). Section III, with a list of references relating to Section I-III, will appear in the December issue.

from the earliest periods have recognised that the symptomatology of pellagra is not limited to those obvious and very pronounced phenomena which characterise the fully developed disease."

That the disease was a generalized affection was recognized by Cajetani STRAMBIO (1789) when he defined pellagra as "*Morbus chronicus totius corporis, cerebri nervorumque functiones potissimum laedens, ut plurimum cum desquamazione dorsi manum, & pedum, aliarumque aevi expositarum partium sive est syndromes eorum, quae retulimus symptomatum, inter quae praecipua, & frequentiora sunt variae affectiones cutaneae, spasmi, dolores, vesaniae.*"

Pellagra is a disease as A. D. BIGLAND has said (1920) "extremely difficult to diagnose and often overlooked unless the possibility of its occurrence is kept in mind." The diagnosis in most of the cases that are published rests firmly enough upon the presence of that trinity of symptoms "*Dermatitis, Diarrhoea and Dementia,*" but while we may admire the alliterative ability of the author of this diagnostic slogan, it is probably true if it be said that nothing has done more to stifle the recognition of early cases and those that do not manifest what have been called the classical symptoms.

HARRIS believes that in an endemic area possibly the majority of cases of pellagra never develop these classical symptoms of the disease, and in this connexion it is of interest to recall the fact that pellagra without skin lesions was recognized by CASAL and later well known to STRAMBIO who used the term "*Pellagra sine pellagra,*" better rendered perhaps by S. R. ROBERTS (1912) as "*Pellagra sine Exanthemata*" [*sic*]. A. G. BIGGAM & P. GHALIOUNGUI (1933) have referred to such cases as larval cases and H. S. STANNUS has used the phrase "*Pellagra fruste.*" It may also here be noted that HARRIS thought that the disease tended to be unaccompanied by skin lesions in particular localities, more especially in the tropics. The first point then upon which I want to lay emphasis is that pellagra is a disease which may show great variety in the picture which it presents, variety in the course which the disease takes, variety in the symptomatology, and variety in the intensity of individual symptoms. In any single case or small group of cases any one or more of what have been considered typical symptoms may be absent. G. A. WATSON (1923) face to face for the first time with an outbreak of pellagra among the inmates at Rainhill could not believe that the mild type and severe fulminating cases were one and the same disease.

It must be remembered that at the one extreme is the case which proves fatal in a few weeks or less, and at the other the pellagrin of eighty years of age or more who has suffered from the disease since childhood.

E. RUD (1934) believes that latent pellagra may not be rare and that many cases regarded merely as dyspepsia with anorexia, colitis, neurasthenia, etc., are in reality examples of that disease. With that opinion I am in complete accord.

Among the symptoms which may precede by many years "an attack" of pellagra in which the classical manifestations are seen, or which may never develop any further, are a gradual deterioration of health with some degree of failure of mental and bodily vigour, a tendency to hypochondriasis or mild attacks of mental depression, periodical digestive disturbances with abdominal discomfort and constipation broken by occasional lapses into diarrhoea, a sore mouth, a sore tongue showing scattered enlarged papillae, soreness at the

angles of the mouth and in women leucorrhoea. Other symptoms later may include indefinite pains in the limbs and elsewhere, odd subjective sensations including vertigo, sometimes disturbances of vision and hearing. The skin may show a peculiar dryness with formation of tiny scales, sometimes limited to uncovered areas, sometimes extending over the whole body, and fine wrinkling best seen on the backs of the hands and over the interphalangeal joints.

Of the objective signs the peculiar soreness at the angles of the mouth, which I shall speak of as "angular stomatitis," is one of the most characteristic, as was pointed out by H. S. STANNUS (1913). When once recognized it cannot be mistaken, I think, with one possible exception, for any other condition. This condition, together with a marginal glossitis are perhaps among the earliest signs and may anticipate more active symptoms by many years.

They were noted by a few of the older pellagrologists, ZANETTI, STRAMBIO and others, and they have received recognition again in more recent times. Thus A. FAKHRY (1932) believes stomatitis to be a common early symptom of pellagra. HARRIS and ROBERTS recognized the pre-pellagrous state. Angular stomatitis has been, of course, noted among native races in the tropics for many years and described as an isolated sign: it has been observed in Africa and in the East, where it has been attributed to the eating of salt fish. The association may be correct but I do not think it is merely a local reaction as has been suggested. More recently it has been considered to be a sign of an A-avitaminosis, and W. R. AYKROYD writing from the Nutritional Research Laboratories, Coonoor, enclosing a photograph of an Indian girl showing very beautifully this condition, says that it is not uncommon and is closely associated with xerophthalmia, both being due, he thinks, to a vitamin A deficiency. Be that as it may, angular stomatitis should be looked upon probably as a prepellagrous sign. This question will be discussed later.

D. T. DAVIES (1931) and others have remarked a condition closely resembling, if not identical with, angular stomatitis in cases of achlorhydric anaemia in this country, a point also to be referred to later. H. J. ROPER of Leeds (1931) referring to DAVIES' observations stated that he had noticed the condition for many years and believed it to be due to injury in inserting and removing large dentures. This is only mentioned here in order to point out that Roper must be referring to some other condition. "Angular stomatitis" does not occur among the ordinary normal adult population of this country. I have looked over many thousands of persons in London without noting the affection.

The early glossitis consists generally in a moist, furred tongue with reddened edges, and scattered brilliantly reddened hypertrophic papillae. Associated with these there may be similar affections of the free margin of the prepuce, of the vulva and vagina, the margin of the anus and perineum.

Attention was drawn to these lesions by STANNUS as valuable signs in diagnosis, both in the prepellagrous stage and in the full-blown disease when the skin about the inner and external canthi and nostrils may also be affected. These conditions are well known to many pellagrologists but not always recorded and perhaps by some missed because they are not looked for.

Turning now to a consideration of the symptoms of pellagra as they are commonly presented in text-books and as they are commonly

conceived in the minds of perhaps the majority of medical men, and dealing firstly with the dermal manifestations—"each spring (or sometimes in the autumn) an acute dermatitis appears on exposed surfaces as the result of the sun's radiations acting on the skin rendered photo-sensitive by some substance developed in pellagra, to disappear again in the autumn"—is the kind of statement generally made and believed.

"Supprimez le soleil et vous supprimerez la pellagre" said LANDOUZY & BOUCHARD in the *Dictionnaire Dechambre*.

STRAMBIO (1789) when he wrote "Ergo desquamatio non est vi solis proportionalis. Ergo causae non correspondent effectus, ideo quae praeter solis actionem aliud quid requirerit, interior scilicet morbosus humorum dyscrasia" recognized that something more than the sun's rays was necessary to explain the skin affection, but more important still, he realized that the erythema was not proportional to the exposure to sunshine, yet the doctrine of sunshine and erythema as cause and effect was one strenuously upheld by SANDWICH and others and persists to this day in spite of abundant evidence to the contrary. The typical distribution of the exanthem on the backs of the hands, cheeks and nose (the "butterfly" area), neck and chest, etc., were held to prove this belief. SANDWICH believed that the terminal phalanges of the fingers escaped because they were hidden from the sun and that when the dorsa of the feet were involved, the area covered by the sandal remained normal. C. MANTHOS (1932) pointed to the fact that in veiled women in Turkey the face was exempt. The case is also cited of the opposite—a man who habitually walked with his hands behind his back, palms upwards, developed an erythema of the palms. The facts are correct as far as they go but, as I shall try to show in a later section, there may be other explanations.

The explanation usually given fails to account for those cases in which the exanthem develops in the winter; for the fact that it is in the spring rather than the summer, when the sun's rays are most powerful, that the erythema appears, as pointed out by T. D. SPIES (1935); for the fact that the rash may appear in its typical distribution in patients who have been confined to bed for some time, and conversely, may be found in these same selected areas in persons whose whole body is exposed to the sun, as observed by E. NEUSSER (1887); for the case of G. A. ZELLER cited by J. N. HYDE (1910), a woman in whom the exanthem failed to appear on a paralysed hand although equally exposed to the sun's rays as the other hand on which the rash occurred, and a similar case recorded by S. R. ROBERTS (1929), etc. T. D. SPIES (1935) has only recently alluded to the erroneous views still held by many writers upon this question. They ignore the fact that the pellagrous exanthem may affect any and every part of the skin of the unexposed surface of the body as stated by E. J. WOOD (1920). They have forgotten that the palms of the hands and soles of the feet may be affected. They have ignored the fact that in cases exhibiting the classical distribution the exanthem typically encircles the wrist, bracelet fashion. To those who have studied pellagra closely it has become obvious that there is a tendency for the exanthem to occur in any area of the skin open to trauma of any kind, using the word in its widest sense.

C. C. BASS (1926 and 1929) has cited cases in which points of pressure were affected, the buttocks and elbows in bedridden patients, the heels and shoulders also in others, the knees in a woman given to long

prayer. The skin over the course of prominent veins liable to friction by clothing may be similarly attacked. Constant exposure to the heat of a fire will determine the appearance of the pellagraderm, as will exposure to X-rays or irritation by a chemical such as carbolic acid, ichthyol, a mustard leaf, etc. Areas of skin liable to intertrigo may similarly be involved—under the breast, as pointed out by C. C. BASS (1929), the gluteal fold mentioned by S. R. ROBERTS (1929), the groins and perineum. The lesions in these latter situations resemble, only naturally, those already described as occurring about the lips, nostrils and vulva. The particular character of the lesions depends upon the histological make-up of the skin to a large extent, a point to which I think attention has, in so many words, never before been drawn. This is particularly true of the skin of the scrotum which when affected is a sign of great diagnostic value, particularly as this lesion may be seen when perhaps there is little evidence of pellagra present and no typical exanthem.

It is a sign which appears to be but seldom recorded and one which, it seems possible, is not looked for and, therefore, passed over. The condition was discovered in 19 of the 131 cases investigated by STANNUS and in 4 of the 19 there was no pellagrous exanthem.

L. MERR (1911) acknowledges the condition as a sign of pellagra and it is also recognized by HARRIS (1919), G. A. WHEELER (1930) and by SPIES. A. D. BIGLAND (1920) met with one case among his 64 Turkish prisoner pellagrins and the affection was noted by MENDELSON in Siam (1919, 1923) and by CANTOR (1927) in a case in Melbourne. It is also of interest to recall the fact that this was the condition which first appeared in the convicts subjected to an experimental pellagra-producing diet by GOLDBERGER (1915), one upon which the diagnosis of pellagra was based. Reference will be made to this affection later when discussing the condition described by LANDOR & PALLISTER.

Another site which may be attacked, although often forgotten, is the nailbed, resulting, as in the skin, in pigmentation and deformation of the nails of the fingers and toes. A. G. BIGGAM & P. GHAIHOUNGUI (1933) have shown that desquamation in the interdigital clefts is very suggestive. The hair may be thinned and there may be some loss of pigment.

In regard to the typical exanthem itself there are a few points which need emphasis as they appear to be not generally recognized. Usually it is of sudden onset and runs a course of some weeks or months—erythema, hyperkeratosis, pigmentation, exfoliation, to healing. In some cases the erythema may be slight and so evanescent as to pass unnoticed. In others the lesion is a severe one. Bullae may develop with ulceration and sometimes ecchymosis; a permanently altered skin may result.

The severity of the skin lesions bears little relation to the severity of the other symptoms; a patient may die of acute pellagra before skin lesions have become evident. Here attention may be called to another matter which has received very little recognition, and appears not to be generally known. Some twenty-five years ago I observed among native African pellagrins that whereas during "the attack" successive areas of skin might become involved rapidly one after the other, after the attack, which lasted a few weeks, no further skin lesions appeared although the patients remained under the same conditions of diet and exposure, and without treatment. The point was even better exemplified in an English child pellagrin (H. S. STANNUS

1934); the skin lesions began to heal during a period of observation when the patient was intensely ill, and before treatment had been instituted. Later various exposures to bright sunlight failed to produce any other reactions than those produced in controls. C. C. BASS (1926) had noted what he called the loss of power of epiblastic epithelium to withstand noxious stimuli and that this lasted but a short time, viz., during the active phase.

T. D. SPIES (1931) has called attention to this point: Three white males and one negress kept on a pellagra-producing diet of corn-meal mush, corn-meal muffins, pork fat, maple syrup, polished rice, corn-starch pudding, coffee and sugar, showed striking improvement. It was thought that the improvement might have been due to the exclusion of alcohol, but the following year this observer (1932) demonstrated that improvement in the skin lesions occurred in eight pellagrins during 6-15 days upon corn-starch and lactose though the stomatitis was adversely affected, and again (1932) that the symptoms cleared up in pellagrins while fed over twenty days with an experimental diet more restricted than that used by GOLDBERGER in producing pellagra in his convicts. T. D. SPIES & H. F. DEWOLF (1933) also showed that in ten pellagrins recovery took place when they were given an adequate diet, together with a large quantity of corn whiskey. Further observations by SPIES (1935) are of interest. Recently by experiment he has shown that exposures of areas of pellagrous dermatitis to large doses of U-V radiation or to direct sunlight do not prevent healing of the lesions even while the patient is limited to a pellagra-producing diet, but he adds that it is difficult to gauge the effect of such experiments as the pellagrous rash itself is never static—it is either getting worse or getting better. He alludes, of course, here to the acute erythema. The experimental work of GOUGEROT & J. MEYER (1932) was without very definite results, but the fact emerges from these observations—one that I would again emphasize—the “susceptibility,” one may call it, to the acute exanthem lasts but a short period of time and is followed by a long “refractory” period. Concerning the explanation of these phenomena I shall have more to say elsewhere. They have received but little recognition, and no attempt has been made to interpret them. A. D. BIGLAND (1920) says “I was never able to make any skin changes appear at will . . . I cannot account for this failure.”

It will be noted what an important bearing, therefore, the above mentioned facts have on the evaluation of treatment.

One other point: although in classical pellagra “the attack” may be expected to recur once a year in the spring up to ten years or more, it must not be forgotten that the interval between attacks may extend to as many years.

Not uncommon, but apparently seldom recognized or seldom recorded, are other affections of the skin known to the older writers STRAMBIO, MAJOCCHI, and others, as seborrhoeic, acneiform, follicular and kerato-follicular, pellagrademics. Accounts of these conditions will also be found in the writings of some later pellagrologists—C. C. BASS (1926), S. R. ROBERTS (1929), HARRIS (1919).

They may be present during the acute phases but are often seen in chronic pellagra and are of considerable value in diagnosis. The seborrhoeiform eruption is usually seen on the face, nose, cheeks and forehead, sometimes on the chest or still more widely distributed; it gives rise to the appearance which has been called “sulphur flake.”

The acneiform condition similarly is found about the nose, on the cheeks, forehead, chin, chest and back, comedo formation being more or less marked. A. D. BIGLAND (1920) notes this peculiar seborrhoeic condition on the face with formation of "sulphur granules" and the branny desquamation over the whole body in some of the Turkish war prisoners; H. KLEINMANN (1931) found what he called hyperkeratosis about the nose in 14 of 63 pellagrins studied in Moldavia, and these conditions were common among African pellagrins observed by STANNUS in 1910-11.

The kerato-follicular lesions of MAJOCCHI are equally interesting. They were described by STANNUS as a folliculitis, and it may be observed that T. E. H. THAYSEN (1932) has remarked the condition in pellagra occurring in Denmark. It was also noted by YANG & HUANG (1934) in cases of pellagra seen at Nanking. These lesions of the pilo-sebaceous glands vary a little in character, some being of the Keratosis pilaris type, others resemble Lichen spinulosus, others again have somewhat the appearance of Pityriasis rubra pilaris. The distribution is rather characteristic—extensor aspects of the arms, the anterior and lateral surfaces of the thighs, the buttocks, and may be the back and chest. They need not be described in more detail; they are easily recognized. These conditions will be referred to again when discussing communications by L. J. A. LOEWENTHAL and by L. NICHOLLS. Two skin conditions of importance in attempting a diagnosis between "attacks" or in some of those cases in which the attack is not apparent may briefly be referred to here. The one is a characteristic persistent increase in the wrinkling of the skin over the proximal interphalangeal joints with slight thickening and change in texture, and a peculiar lilac colouration. The second is the appearance most commonly seen in the skin of the shins, which looks as if a smooth layer of lacquer had been applied and then cracked mosaic-fashion, the colour varying according to race, in the European a transparent yellow, like yellow tracing paper, and proportionately darker in the darker races. This is probably the condition to which STRAMBIO referred as being like "the skin of a duck's foot."

In old pellagrins the dry, smooth, glossy, parchment-like atrophic skin characteristically seen on the backs of the hands needs no comment.

Associated with the skin lesions some oedema is often present, it may be noted in the face giving a "puffy" appearance and is not uncommon in the lower extremities—a fact often forgotten. A. D. BIGLAND (1920) said "from a study of the literature it appears that oedema is a symptom of great rarity." He found only one reference, that by KULZ. As a matter of fact it is not uncommon, as BIGLAND found in his Turkish prisoners of war. It was noted in my African native cases and has been remarked since the time of STRAMBIO.

In summarizing, the point which I wish to make, in regard to the skin lesions, is that essentially they are all of the same order. They vary only according to the intensity, duration and recurrence of the pathological process producing them on the one hand and upon the differences in histological structure of the skin in different parts of the body on the other.

A study of the lesions in mucous membranes will show that the same is true, and further that the affections of the mucous membranes are homologous with those of the skin. This point has not been duly recognized but it is an essential one if we would attempt to understand

the method of production of these conditions, a matter which will be discussed in a subsequent paper.

As in the skin so in the mucous membranes, the reactions seen in pellagra vary in intensity and vary somewhat according to site. Those that are open to inspection have been described, those that cannot be viewed have been inferred. Beginning with the conjunctiva and cornea, as more nearly allied to the skin, in early stages redness and lacrymation with epiphora may be observed. Xerosis has been described from early times, phlyctenular ulceration and keratomalacia may occur in some proportion of cases. The nasal mucosa is involved causing coryza and sneezing. The varied but characteristic, well known changes in the tongue—congestion, exfoliation, etc., are the counterpart of those in the skin. The same is true of the mucous membrane of the mouth, pharynx, oesophagus and larynx. The gums are similarly affected and exfoliation at this site and on the cheeks may give rise to the formation of a pellicle, but true ulceration here, as in the skin, is probably rare in pellagra. It is sometimes said that "the gums are swollen and bleed easily" and that this gave rise to the name Alpine Scurvy used by ODOARDI. I believe this to be not quite correct; the mucous membrane of the gums is congested and may bleed on injury, gingivitis may be present because the gums are not cleansed properly, but the condition present is not in my opinion the same as in scurvy.

In dark-skinned races among whom there is commonly some pigmentation of the mucosa of the mouth, tongue and gums, the pigmentation may be increased. A blue lividity on the inner surfaces of the cheeks and areas of dark pigmentation on the tongue and gums may be then conspicuous.

Salivation corresponding to epiphora and nasal discharge is not uncommon. Vaginitis, proctitis, possibly urethritis, are of similar nature. The characteristic watery diarrhoea suggests that the intestinal tract is in the same way affected. It is interesting to note that in the earlier cases the diarrhoea comes in attacks rather as does the erythema of the skin. Here, again, I believe that probably ulceration of the bowel, though it has often been described as such, is no part of true pellagra but a secondary phenomenon.

These various conditions will not be further discussed, but it must be noted that any one or more of them may be absent in any single case or group of cases. A case of classical pellagra may come to be a fatal issue with a normal mouth.

The incidence of some of these lesions may here receive a brief notice. E. WEISS collected statistics in an endemic area in the Tyrol between 1905 and 1907. There were 8,436 cases of pellagra in a total population of 384,073. Of the pellagrins 61·4 per cent. exhibited skin lesions, of an erythematous character in nearly half. Of these last the dermatitis affected the backs of the hands in 77 per cent.; hands and neck in 13 per cent.; neck and other parts 7·5 per cent.; other parts 2·4 per cent.

Among STANNUS' native African prisoners, of a total of 131, 97 showed the exanthem. Of those with exanthem, in 30 it was limited to the backs of the hands, wrists, forearms and arms; in 29 the supraclavicular regions were affected as well; in 19 all these areas were involved together with the neck; the face was also affected in 12 more; in 6 some part of the legs and body were also included; in one the whole body was involved.

Of the 97 cases exhibiting the exanthem, 26 showed a normal oral cavity ; in 26 angular stomatitis was present with or without glossitis ; in 9 the tongue was involved but not the lips. In 5 there was a generalized acute stomatitis. The scrotum was attacked in 19. Soreness at the canthi, nostrils, preputial margin and anus was not uncommon.

Affections of the vulva and vagina were considered to be common in women pellagrins by the Illinois Pellagra Commission (1912).

E. D. CRUTCHFIELD (1928) found among 109 cases studied at Galveston, Texas, that 64·57 per cent. showed lesions of mucous membranes. Glossitis was the most common ; stomatitis was noted in 21·27 per cent., gingivitis in 16·14, vulvo-vaginitis in 12·1, proctitis in 10·09 per cent.

L. MERK (1909) on the other hand mentions that in twelve months in the Tyrol he did not see a couple of cases exhibiting buccal or genital lesions !

T. R. BOGGS & P. PADGET (1932) among 102 cases of sporadic pellagra in Baltimore, of whom 44 per cent. were admitted to hospital on account of the skin lesions (though all had typical skin lesions), found that the backs of the hands were affected in 100 per cent., face and neck in 23·5, elbows 12·7, feet 8·8, perineum in 23 ; 74·5 per cent. showed stomatitis.

R. H. TURNER (1931) discovered glossitis in 26 of 42 pellagrins under observation in New Orleans. A. G. BIGGAM & P. GHALIOUNGUI (1933) in Cairo observed the buccal cavity involved in 24 of 26 cases of pellagra.

Changes in the finger-nails are common according to ANTONINI (1902). ALPAGO-NOVELLO (1894) held that demonstrable changes in the finger-nails were present in 94 per cent. of pellagrins. E. VERGA (1915) found marked changes in the finger-nails in 4 per cent. and in the toe-nails in 2 per cent. ; less marked changes in 10 and 12 per cent.

It is not proposed here to say much about the other sides of the symptomatology of pellagra but a few observations upon points which I believe up to date have been wrongly interpreted, may be made.

One of the most constant subjective symptoms in pellagra is " burning pain " and tingling, sometimes limited to " burning pains " in the palms of the hands and soles of the feet, sometimes also experienced in areas of skin upon which the erythema will appear, in a few in the scalp or the whole body. The burning pains and tingling of the palms and soles are unquestionably of the same nature as those felt elsewhere in the skin and, I believe, exactly comparable with those in mucous surfaces, in the mouth, tongue, cheeks, and pharynx. These sensations are often referred to, together with other symptoms, as if they were signs of a neuritis. By A. G. BIGGAM & P. GHALIOUNGUI (1933) they are mentioned as nervous manifestations. I believe this not to be true as I shall hope to show when dealing with pathogenesis elsewhere. These " burning pains " are almost pathognomonic of pellagra, though something of the kind may be found in acromegaly, at the menopause, possibly in ergotism and the epidemic acrodynia of the first half of the 19th century in France, and has been stated to occur in the dry form of beriberi associated with a scaly skin. (!)

Gastro-intestinal symptoms will also be referred to elsewhere, digestive disturbances, consisting of discomfort after meals, a feeling of fullness, wind, burning sensation, pyrosis, etc., are present in the majority of cases.

Symptoms pointing to changes in the central nervous system and mental manifestations likewise will not here be dealt with except to remark that many of them in acute pellagra are due to derangements of function and that they may vary in a very short time, in a matter of days, well shown in a case under my own care, H. S. STANNUS & C. R. GIBSON (1934). In regard to mental disease it is not always made clear that the association of a psychosis with pellagra is twofold: there is the mental derangement which occurs as a result of pellagra—which forms part of the disease, and secondly pellagra is prone to occur in the insane. The reasons for this will be suggested elsewhere when dealing with the aetiology of the disease. This distinction is seldom pointed out but it is a very important one. The changes in the blood will also be discussed elsewhere.

Pellagra in children may here receive a word of comment. It has been thought to be a rare affection in children by some, to quote only one recent writer, Miss C. WILLIAMS (1933).

J. GOLDBERGER & G. A. WHEELER (1928) during field investigations in S. Carolina demonstrated a preponderance of pellagra incidence in children between the ages of 2 and 15 years. A. FAKHRY (1932) found male children under the age of 12 to be particularly susceptible in Egypt, an interesting observation in view of the fact that SANDWITH thought pellagra was rare under the age of 10, and the statement that he had never seen a case under the age of 15 years. Many of SANDWITH's observations, however, have been proved to need modification, and L. SAMBON (1910) commenting upon the matter pointed out that the erythema in children is often so mild and evanescent that it may escape observation. SAMBON mentions cases in infants, the youngest being 5 months old. He believed that the "incubation period," as he called it, might be as short as three weeks.

S. R. LUSTBERG & J. A. K. BIRCHETT, Junr. (1922) have contributed interesting observations upon pellagra in 5 to 10 months old breast-fed children of pellagrous mothers. The mother develops pellagra during the three winter months on a diet of dried peas and beans, musty corn-meal, sugar, molasses, salt hog meat, rice, coffee, canned milk, and lard. The infant is frail, restless, suffers from bouts of diarrhoea, a sore mouth, and develops the exanthem, may be on hands and feet. The cases are mild and respond to healthy wet nurse feeding or a diet of good milk, fruit juice and vegetable purée.

E. LEWIS (1926) has given a full account of pellagra in a coloured infant of 17 months of age which will serve as a good illustrative case.

Loss of weight noticed on September 1. On November 1 eruption noted behind knees. There were four loose, foul smelling stools per day. The child was apathetic but fretful, emaciation more marked, both feet oedematous. Pigmented areas then appeared behind the left ear, and on the forehead; the skin of the chin, chest and shoulders became dry and scaly; the exanthem with desquamation then noted on the backs of the hands and wrists and right forearm, the dorsum of the penis, scrotum, perineum, the inner and outer sides of the thigh, the popliteal space and calf, the right buttock and lumbar region; the dorsa of the feet exhibited lightly pigmented areas, the toes were purplish in colour, there was desquamation of the soles of the feet. Angular stomatitis was present, the gums were inflamed and the mucous membrane of the right side of the mouth congested. The child recovered on being given yeast, beef, and codliver oil.

LAVINDER has seen pellagra in nurslings; he thinks the tongue is often affected before other symptoms appear, then the gums, followed

by gastro-intestinal derangement, and lastly the exanthem with pain in limbs about the joints.

D. L. SMITH considers that the earliest manifestations in infants are on the nervous side, then diarrhoea, sore mouth and later the rash which is more commonly noted in the pubic region, on the neck and forehead, more rarely on the backs of the hands and feet. Probably many die of diarrhoea before the diagnosis is made.

C. J. BLOOM (1928) writing upon the subject says: "The infrequency of pellagra in infancy and childhood is without proof or substantiation." From his figures for annual numbers of deaths in children from pellagra there would appear to be more deaths in the first five years of life than in the second or third 5-year periods in the proportions 458 : 424 : 383.

These are, of course, cases of pellagra fully diagnosed ; it seems very possible that many milder cases go undiagnosed in young children.

THE NATIVE MEDICAL PRACTITIONER IN THE WESTERN PACIFIC AND THE CENTRAL MEDICAL SCHOOL IN SUVA, FIJI.

By Thomas CLUNIE, M.B., Ch.B., *Medical Superintendent Colonial War Memorial Hospital, Suva,*

and

V. W. T. MCGUSTY, M.B., *Late Inspecting Medical Officer, Fiji.*

General Remarks.—Great Britain, France and the United States of America, with respect to the health of their native peoples in certain of their Colonial possessions in the islands of the Southern Pacific Ocean, are participants in a scheme under which native youths are sent to a Central Medical School at Suva in the Colony of Fiji, whence, after a four years' course of studentship, they are returned with the diploma of Native Medical Practitioner to serve under their respective administrations.

The participating administrations.—Those of the administrations participating in the scheme which are British owned fall within the following classes :—

(a) All territories administered by the Governor of Fiji as Governor and High Commissioner of the Western Pacific, which include the colonies of Fiji and the Gilbert and Ellice Islands; the British Solomon Islands Protectorate; the native Kingdom of Tonga, and the Condominium of the New Hebrides in which France is the other partner.

(b) All the tropical island territories which are administered by the Government of New Zealand comprising the Cook Islands, Niue, the Mandated Territory of Western Samoa and the Tokelau Islands.

(c) The phosphate producing island of Nauru, which is administered under mandate by the Commonwealth Government of Australia.

The United States Government is interested with respect to the Territory of Eastern Samoa where the Navy Department has established an efficient health service, and the introduction of the Native Medical Practitioner may only be experimental. France's participation is limited to her interests in the New Hebrides Condominium.

The native peoples of the Southern Pacific.—The administrations participating in the Native Medical Practitioner Scheme contain representatives of each of the three main subdivisions of the Pacific Islanders, namely Polynesians, Micronesians and Melanesians; and while there exist as between Polynesian and Micronesian on the one hand and Melanesian, on the other, marked differences both in physical characteristics and mental capacity, all of the three peoples, prior to European intervention, were in the Neolithic stage of civilization. Similarities in diet and climate, and the diffusion of culture which resulted from the great Polynesian migrations that are said to have taken place in spite of primitive craft and vast ocean distances, have tended further towards the creation of affinities and the obliteration of differences in the form of their social systems. Since the communal form of society is found to be universal in its distribution, it is a factor of great importance in framing a government suited to the character and requirements of the Pacific islanders, and the ultimate success of

any public health undertaking depends on the extent to which it can be moulded into the framework of their society. In the realm of disease, affinities are taken a step further because, with the exception of malaria, which is confined to the New Hebrides and Solomon Islands, identical problems arise everywhere as regards both indigenous diseases and those which have been introduced with European colonization.

The estimated population at the 31st December, 1931, in each of the administrative units was as follows :—

Fiji	...	...	...	...	185,573
Gilbert and Ellice Islands Colony	...				33,699
British Solomon Islands Protectorate	...				94,000
Kingdom of Tonga	...	...	...		28,830
Western Samoa	...	...	...	...	47,000
Cook Islands	...	...	...	...	11,500
Niue	...	...	...	...	3,834
New Hebrides	...	...	...	...	50,000–60,000
Eastern Samoa	...	...	...	..	10,184

All of these places are intimately concerned with the problem of depopulation, which has been solved in Fiji largely through the agency of the Native Medical Practitioner, and which is now being hopefully attacked on similar lines in the other places.

The Native Medical Practitioner in Fiji.—The native Kingdom of Fiji was formally annexed to Great Britain at the request of its chiefs and people on the 10th October, 1874. A medical service was afterwards inaugurated and in the first Colonial Estimates prepared for the year 1875 provision was made for the salaries of a Chief Medical Officer and one District Medical Officer. In June 1888 an Ordinance entitled the Native Medical Practitioners' Ordinance was passed by the Legislative Council in preparation for the issue of their certificates in January, 1889, to the first eight Fijians to qualify as Native Medical Practitioners. The credit for the introduction of this service must be given to Dr. B. Glanville CORNEY, an early Chief Medical Officer, whose work in this and other directions has been an inspiration to his successors. He saw the urgent need for some organization that could rapidly, economically and effectively break down the barriers of prejudice and superstition. He recognized the prohibitive cost of maintaining an adequate service of European Medical Officers, and the insuperable difficulty of finding a group of professional men psychologically and physically fitted to deal with such a situation. Experience of the devastating effects of the measles epidemic of 1875 and the advent of Indian immigration had drawn attention to the necessity to protect the natives against smallpox. European vaccinators were tried but they proved too costly and were not invariably satisfactory. Young natives had already been tried as dressers and dispensary assistants and it was decided to entrust them with the greater responsibilities of public vaccinators. Their success in this capacity seems to have led to the establishment of the Native Medical Practitioner, and the institution of the Native Medical Practitioner may thus have been largely due to the necessity to make vaccination less costly.

Once it was created there was no difficulty in fitting the new service into the organization of the medical department of Fiji, under which the Colony is subdivided into medical districts, to which European

Medical Officers are posted as far as possible. With the advent of the Native Medical Practitioner the main districts, in proportion to their size and population, were divided into subdistricts to which Native Medical Practitioners were posted, and made responsible under the District Medical Officers for the health of the natives. The popularity which the service gained from its inception, the recruitment of its personnel from among the most influential native families, its cheapness and the ease with which it fits into the native social organization have been outstanding factors in promoting its success in Fiji. It has also been found that in most instances Native Medical Practitioners bear the strain of responsibility surprisingly well, and this attribute is enabling the Government to withdraw European Medical Officers from several districts and to adopt a Colony-wide policy of concentrating on hospital and public health services. In the changing conditions of Fiji it has become necessary in some instances to extend the duties of Native Medical Practitioners from the purely native to the general community; nevertheless, the essentially native character of the service has been maintained under a system of rigid Government control which discourages Native Medical Practitioners from obtaining employment in a private capacity.

The success of the Native Medical Practitioner service is dependent on its low cost and the retention by its members of their native character. Any tendency to regard it as other than a subordinate service would be liable to upset the delicate social and economical balance on which its success depends.

In computing the value of the salaries of Native Medical Practitioners it is necessary to take account of the benefits that accrue to them as members of the native communal society in the form of service, food and gifts, and taking all the circumstances into consideration their salaries are maintained at a level which is commensurate with the dignity of their position, and they secure as well the advantages of Civil Servants with respect to pension.

As regards their number the Native Medical Practitioners in the Fiji Service were for many years restricted to twenty, but the expansion that has taken place under the influence of improved training facilities has brought about the steady increase in the personnel which is illustrated in the following table :—

<i>Number of appointments</i>					<i>Year</i>
10	...	...	...	...	1890
17	...	...	...	...	1900
33	...	...	...	...	1910
39	...	...	...	...	1920
51	...	...	...	...	1930
59	...	...	...	...	1935

The Indian Medical Practitioner.—It was thought on account of the success of the Native Medical Practitioner Service as a means to contend with the native health problem, that a similar system might be introduced for the benefit of the growing Indian population of Fiji. The Central Medical School was accordingly opened to Indian students, and the first of these to qualify received his certificate in December, 1925. Practical experience has shown that a system which could advantageously be moulded into the social system of the communally living natives, could not confer equal benefits upon the individualistic Indian community, and under the present circumstances the Indian

branch of the Service cannot advisedly be expanded beyond a limited number of appointments to hospitals and dispensaries in Indian districts, with the addition, possibly, of one or two travelling appointments. The certificate of the Central Medical School, except in Government appointments, does not entitle Indian graduates to practise, and in all the circumstances it is desirable that this limitation should stand.

The Native Medical Practitioner outside Fiji.—Prior to the introduction of the present scheme for training natives from the different administrations at the Central Medical School, only two Native Medical Practitioners had been employed in a permanent capacity outside the Colony. One of them, Sowani Puaman, qualified in 1899, and in 1905 he was transferred to the Gilbert and Ellice Islands Colony. He quickly proved his worth as administrator as well as doctor and in 1918 he was put in charge of the Medical Department of the Gilbert and Ellice Islands Colony. Prior to his secondment to Fiji in 1935 he was awarded the distinction of the Order of M.B.E.

The other was Wilisoni Lagi, and he with the permission of the Fiji Government did valuable work in New Guinea as a medical missionary under the auspices of the Methodist Mission Society. These two are isolated instances and the extension of the Native Medical Practitioner, as an actual service, beyond the confines of the Colony of Fiji was a direct result of the post war campaign work in the Western Pacific of the International Health Division of the Rockefeller Foundation, and of the realization by the Foundation's officers that the ultimate success of their work was dependent on the establishment within each administration of a permanent health organization. They also realized that such a service must combine the advantages of low cost and adaptability to native conditions, and they found the solution of their problem in Fiji where, under very similar conditions, the Native Medical Practitioner system had been in successful operation over a period of several decades. Through the very generous financial assistance that was afforded by the Foundation it became possible to extend these benefits to other Pacific administrations.

The Central Medical School.—As a result of the negotiations that were conducted between the Rockefeller Foundation and the Government of Fiji, and of the Foundation's financial assistance, the buildings and equipment of the old Suva Medical School were extended and improved in time for it to be opened in 1928 as the Central Medical School, with 40 students in residence drawn from seven separate administrations. The responsibilities for carrying out all of the local arrangements devolved upon Dr. Aubrey MONTAGUE, the late Chief Medical Officer of Fiji. Dr. Victor G. HEISER, late Divisional Director of the International Health Division of the Rockefeller Foundation, was among the first to appreciate the importance of enlarging the Native Medical Practitioner Service, and his advocacy was instrumental in securing the Foundation's approval. The Fiji Government readily consented to make the Native Medical Practitioner available to any other Administrations that desired to enter the scheme.

Evolution of Teaching.—The earliest students, limited in number to eight, learned their profession in the wards of the old Colonial Hospital where they worked as dressers and male nurses, receiving clinical instruction from the Resident Medical Officer, and practical guidance from Miss M. C. ANDERSON, who held the post of Matron with

great distinction for many years. This was the training which produced those pioneers whose work gained for the Native Medical Practitioner the high reputation which he now enjoys. In 1901 the amenities at the school were improved by the addition of a two-storied residence capable of accommodating twelve students, of a special lecture theatre, and of some rudimentary scientific equipment. Theoretical teaching was gradually incorporated into the syllabus, while the practical side of the course has also improved with the steady increase in volume of the work of the Colonial Hospital. In 1923, when the old hospital was replaced by the present substantial Colonial War Memorial Hospital, the Medical School seems to have been overlooked and the students' lectures had at first to be conducted in an ordinary room, but in 1927 the whole scope of the school was enlarged in preparation for its becoming the Central Medical School. Living quarters were extended to accommodate forty students. A new school building was erected of ferro-concrete with a lecture theatre, laboratories, a museum and a library, and equipment was provided to meet the requirements of teaching. At the same time the teaching system was expanded and reorganized; a full-time tutor was appointed, and lectureships in the subjects of a course that had become very similar to that of an English medical college, were distributed to medical men and others who willingly accepted posts as honorary lecturers. In 1935 a further important advance was made when a Pathological Laboratory was presented by the Rockefeller Foundation, and a highly qualified pathologist was appointed to take charge of it. In 1931 the period of studentship had been increased from three to four years, and since the school is closely affiliated with the hospital, students are given the fullest opportunities to gain practical knowledge by participating in its activities. It can be claimed with full justice that the standard of teaching makes the graduates of the Central Medical School competent to assume, on their own initiative, the ordinary responsibilities of Medical Practitioners and health officers.

English as the medium of instruction.—Since the students are drawn from places where different languages are spoken, English is used as the medium of instruction, and among its other advantages this measure, by requiring a somewhat high standard of school education, tends to raise the intellectual level of the average student. In some Administrations the standard of school education is much lower than that of Fiji, and in the case of the Solomon Islands this defect has necessitated a temporary departure from the important principle of admitting only students of pure native blood as that Administration's quota could only be filled by admitting two students of mixed blood, and its need was too urgent to permit delay.

Adaptation of teaching to the mean intellectual level of students.—As regards their intellectual capacity, students of Polynesian and Micronesian origin are on a higher plane than those of Melanesian origin, and much ingenuity has been shown by the tutor and the school staff in adapting the teaching to the intellectual level of the average Melanesian without sacrificing the subject matter of the course, or unduly retarding the education of the more able students.

Cost of the Central Medical School.—The scheme under which the expenses of the school are shared between the participating Administrations requires each government to fill its quota for a specified period; to pay fees on a *pro rata* basis and to pay a forfeit with respect to each unfilled item in its quota. This simple and equitable arrangement

has worked satisfactorily. The all in *per caput* cost of students at the Central Medical School amounted to £73 in 1934. Only Government students are admitted to the school and no student is admitted in a private capacity.

Administration.—The Governor of Fiji and High Commissioner for the Western Pacific is the supreme authority in the administration of the Central Medical School, and he is assisted by an Advisory Board consisting of Dr. S. M. LAMBERT of the Rockefeller Foundation, the Secretary of the Western Pacific High Commission, the Medical Superintendent Colonial War Memorial Hospital, and the Director of Medical Services, who is the Board's *ex officio* chairman. The title of Tutor was changed to that of Principal on the 1st January, 1936. No administrative difficulties of any consequence are caused by the heterogeneous origins of the students, and in the maintenance of discipline the Principal is loyally assisted by the head student and by a students' Council. There is also a fine *esprit de corps* in the school, which is perpetuated in the lives of its graduates.

Preservation of native character in school life.—The diploma of Native Medical Practitioner, as its name implies, is intended to be awarded to graduates of pure native blood. The term Indian Medical Practitioner is applied in the case of East Indian graduates who have been trained in the school in circumstances that are peculiar to Fiji. The essentially native character of the service is stressed as much as possible in the living conditions of the students, who are encouraged to dress themselves after the manner of well-bred natives, and to retain all of their native manner of living that is possible under conditions of studentship. This ensures, as far as it is possible to do so, that graduates shall return to their homes with a wholesome respect for the customs and manners of their own people and glide easily into their proper groove in the native social system, whence they can most readily spread the knowledge they have acquired. There is no present need for a service of native doctors with qualifications approximating European standards, and if a time should ever come when it may be desirable to train natives for positions of the highest responsibility in the medical services of the Pacific Islands, it will be fitting to give them the benefits of the more comprehensive education that is available in a large medical college in Australia or New Zealand, and to permit the Central Medical School to continue in the discharge of its present useful function. Any raising of the status of its diploma towards a European level would defeat the objects of the Central Medical School, both by encouraging the graduates to demand higher rates of salary and by removing them from their place in their native social environment. Since, therefore, the retention of the diploma at its present level would seem to be fundamental to the purpose for which the school was created, the safeguarding of this principle cannot be regarded as reflecting unfavourably either on the staff or the students of the Central Medical School.

Supervision of Native Medical Practitioners.—In the case of Fiji it has been found that regular inspection tends to encourage Native Medical Practitioners to keep their efficiency at a high level, and, this principle being applicable everywhere, should be practised as far as circumstances allow. But there is no justice in the argument, which is not infrequently heard, that in the absence of inspection the work of a Native Medical Practitioner ceases to be of value, for it has been refuted by the example already quoted of Sowani Puaman, and by the conduct

of countless others working under conditions of comparative isolation. The enlarged scope of the service must embrace many situations in which Native Medical Practitioners will be thrown almost completely on their own initiative, and it is therefore fortunate that they have proved themselves capable of rising to such occasions, and that their training in the Central Medical School deliberately aims at inculcating a spirit of independence of thought and action.

The similarities that are found everywhere in the conditions under which Native Medical Practitioners are working demand the application of uniformity and continuity of policy. Pending the unification which is contemplated to embrace the medical services of most of the participants in the scheme, and the introduction of a system of regular inspections from headquarters in Fiji, centralization has already advanced far enough to enable the Native Medical Practitioner service to be controlled as a single unit with reasonable efficiency. The most important of existing co-ordinating influences is the recognition by the High Commissioner for the Western Pacific and by the Government of New Zealand of the Director of Medical Services in Fiji as Central Medical Authority with respect to the other administrations. He receives valuable assistance and advice from Dr. S. M. LAMBERT, who, as the representative of the Rockefeller Foundation, maintains a very close personal touch with the affairs of each Administration. A system is also in force under which regular reports on the work of the Native Medical Practitioner are received from each Administration, and commented on by the Central Medical Authority. Again, from the standpoint of the Native Medical Practitioner, close touch with the school and with one another is maintained through the agencies of the Post-graduate department of the Central Medical School, and of a journal entitled the "Native Medical Practitioner" which is published twice yearly at the schools. The Post-graduate school provides a very comprehensive refresher course which can accommodate four Native Medical Practitioners every year and which is keenly sought after by them. The school journal contains many articles written by Native Medical Practitioners and constitutes an important advance in their education.

While a Native Medical Practitioner is believed to exercise his maximum efficiency when working in the Administration of which he is a native, and it is not considered advisable to make general the practice of transferring these officers between different administrations, the general uniformity of conditions which exists throughout the islands where the system is in force has permitted of a Native Medical Practitioner of one group being successfully employed in another. Instances of this are to be found in the cases of the British Solomon Islands Protectorate and the New Hebrides Condominium, where the selection of suitable native students has presented temporary difficulties and vacancies in the Native Medical Practitioner Services have been filled satisfactorily by natives of Fiji.

Child Welfare.—No report on Medical activities in the Southern Pacific can be regarded as complete without some reference to Child Welfare Work, which has been carried out with amazing success in Fiji since its introduction in 1927, and which is being extended through the Native Medical Practitioners to the other territories. Child Welfare now forms a special subject in the syllabus of the Central Medical School, and both students and Post-graduates are given a very practical training in these duties in the native villages situated

in the Suva neighbourhood. Experience has shown very clearly the necessity both for keeping the level of Child Welfare Work within the capacity of the native women and of delegating to them as much as possible of the responsibility for carrying it out. The main object of the work is to inculcate a spirit of self-reliance, and it would inevitably be defeated if the natives were led to believe that success is in any way dependent on complicated health surveys by scientifically trained officials or by the use of drugs and food substitutes. All this is not to deny the great value that attaches to visits of inspection by persons qualified to help and advise, and it is in this direction that Native Medical Practitioners keep the work at a high level of efficiency by maintaining the closest possible touch with the village workers. It has been observed in the case of Fiji that Child Welfare Work has greatly raised the status and importance of the women, and that their insistence on cleanliness in the interests of the children is having a remarkable effect in improving the sanitation of the native villages.

Through the influence of Child Welfare, public health is being made to enter the lives of these native peoples at birth. Its persistence during childhood and adolescence is ensured by the teaching of hygiene in schools as well as by the medical inspection of school children, and it is safeguarded in their adult life by the extreme accessibility of the Native Medical Practitioner system.

Conclusion. – Taken individually the Administrations participating in the Native Medical Practitioner scheme have not the means to embark on elaborate enterprises to provide adequate medical services, but by a pooling of their resources, as is now the case at the Central Medical School, it is felt that they will be able to elaborate a common form of health organization that will bestow further benefits on the native peoples. In Fiji the system has been proved successful after a long and searching trial, and if it is too early yet to claim the same success with regard to its more recent ramifications into the other Pacific Administrations, the similarity of conditions and the favourable reports that are coming to hand appear to provide full justification for the confidence which those of us who are in the closest touch feel with regard to the future of the Native Medical Practitioner in the Pacific. As the system becomes more permanently established everywhere it will suffer progressively less from the effects of destructive criticism, but there will always remain the danger that some over enthusiastic supporters may lose sight of the fundamental cause of its success and in a misguided attempt to raise the status of the Native Medical Practitioner may defeat the purpose for which the school was created, namely to make a health service available to these native peoples at a low cost and in the form that is most easily assimilable by their society.

MALARIA.

FEDERATED MALAY STATES. **Annual Report of the Malaria Advisory Board for the Year 1935** [KINGSBURY (A. Neave), Chairman].—13 pp. With 1 chart. 1936. Kuala Lumpur: F.M.S. Govt. Press.

Monthly returns of malaria cases admitted to Government and estate hospitals in the four States of the Federation indicate that the Federated Malay States has entered upon a period of increasing malaria incidence. Periodicity of malaria in Malaya is irregular, being influenced by Indian and Chinese immigration; the majority of these immigrants are stated to be relatively non-immune. Immigration in its turn is influenced by trade "booms" and "slumps." The Malaria Advisory Board do not consider it likely that a widespread epidemic of very serious and explosive type will occur, but precautionary measures have been adopted. Wherever local incidence has been excessive the brush method of oiling at ten-day intervals has been replaced by the original spray method of oiling at seven-day intervals, a change which has been followed by a reduction in the number of cases reported. Such an intensification of larval control is easy of application in areas under the control of the Sanitary Board and on large plantations and mines, but in *kampung* areas the control of mosquito-breeding, in existing circumstances, is difficult or impossible. For this reason a bill to provide for the destruction of mosquitoes has been drafted and will shortly be enacted.

Reference is made to the results obtained with atebirin musonate (methyl-sulphonate) in the treatment of malaria. This drug was found to be more powerful than either atebirin or quinine in its immediate effects on parasites and on fever. It had, however, no effect on the number and viability of gametocytes. These were able to infect mosquitoes readily on the seventh day after treatment when the drug was still present in the system in comparatively large amounts. The minimum daily effective dose, on each of two successive days, appeared to be 0.3 gm., either intramuscularly or intravenously.

In collaboration with the Malaria Commission of the Health Organisation of the League of Nations experiments are being carried out to determine the value of atebirin as a clinical prophylactic.

The Report contains information regarding the local costs of oil spraying; the deterioration of open cement drains under the influence of acid water; experiments with fascine drainage, and the control of anopheline breeding by shading. The Anopheline Survey of part of the Selangor Coast Area continues. *A. hyrcanus* var. *sinensis* and *A. vagus*, generally considered to be fresh water breeders, are frequently associated with *A. sundaicus*, a salt water species. As rainfall increased *A. vagus* replaced *A. sundaicus* completely in certain breeding places.

During the year the mail trains arriving in Kuala Lumpur from Singapore and from Penang were searched for anophelines; considerable numbers were found. One *A. aconitus* was found to have a gut infection.

Norman White.

ANTONINO (Lambusta). *Profilassi antimalarica nelle zone tropicali con speciale riguardo alle nostre colonie in Africa Orientale. [Malaria Prevention in the Tropics with Special Reference to Italian Colonies in East Africa.]—Ann. di Med. Nav. e Colon.* 1936. May–June. 42nd Year. Vol. 1. No. 5–6. pp. 211–220. With 1 chart & 6 figs. on 2 plates. [14 refs.]

This paper was evidently written for the special benefit of medical officers working in Italian Colonies in East Africa. It contains some general statements regarding the importance of malaria as a cause of morbidity and death in tropical countries, a description of the more important anopheline vectors in East Africa and a good summary of anti-malaria measures. The plates illustrating the characteristics of African anophelines are reproduced from Memoir No. 3, 1927, of the Liverpool School of Tropical Medicine. N. W.

KOMP (W. H. W.) & CLARK (H. C.). **A Fifth Year's Observations on Malaria in Panama, with Reference to the Failure of Atabrine to control an Epidemic.**—*Amer. Jl. Trop. Med.* 1936. Mar. Vol. 16. No. 2. pp. 109–131. With 1 chart. [10 refs.]

It is not only useless but even harmful to attempt to control malaria by means of drugs in a hyperendemic area like Panama.

The authors conclude:—"It is galling to make a confession of failure, but our recent experience, and the deductions of other workers, lead us to believe that, under our local conditions, it is to the people's best interests (and ours) to interfere as little as possible with the course of their malaria infections. Our main object, increasing the efficiency of native labor, may be accomplished by treating only those actively ill among the adults, and allowing the children to build up an immunity through repeated attacks of the disease . . . treatment can be entrusted to an intelligent native "practicante," and may be instituted without the necessity for time-consuming expensive blood-surveys. For such treatment, atabrine would seem to be the drug of choice, because of its lack of toxicity, ease of administration, and rapid curative effect." For six years they have been carrying out experiments with the object of controlling malaria in villages by means of drugs and during the last two years they have treated every person found positive with atabrin gram 0.2 daily for 5 days, followed by plasmoquine 0.02 gram daily for a further 5 days. As regards plasmoquine, there were cases with toxic reactions, but they were not so frequent as when the two drugs were given simultaneously. The authors believe that there is little use in administering plasmoquine in therapeutic doses for the purpose of destroying crescents, because in 90 per cent. of their crescent cases the crescents appeared on the first day on which parasites were found, and had doubtless infected mosquitoes before treatment was begun. "This, together with . . . the severe toxic effects sometimes associated with its use, lead us to believe that no results can be obtained sufficient to warrant the use of this costly drug."

Malaria in Panama, as elsewhere, is subject to cyclical variations. An epidemic of malaria swept over the country in January, 1935. The villages under prophylactic drug control with atabrin and plasmoquine not only suffered as much as the control village, they suffered even more. During the epidemic period every person living in the atabrin-treated villages, whose blood was positive, was treated

until negative, but, nevertheless, the parasite rates continued high. In some of the atebirin-treated villages the incidence of malaria was greater than in the untreated controls; heavy infections and serious cases were commoner, and the proportion of crescent cases was greater. "Some unfavorable factor was active during the epidemic period, and we believe this to be the lowering of the natural immunity (or tolerance) of the community, caused by relative freedom from low-grade infections. In the usual course of events, as typified in the control town of Chilibre, only the clinical, disabling infections would be treated by the patients themselves, leaving the subclinical, low-grade chronic infections to smoulder untreated. We have interfered with this natural course in our treated towns, by endeavoring (with a considerable degree of success) to stamp out even the low-grade, chronic infections, particularly those which occur in young children. The results of this interference developed during the epidemic period. A high infection rate, an increased number of clinical cases, and a great increase of heavy infections occurred, particularly in those towns most thoroughly treated." A high crescent rate was associated with the high rate of heavy infections especially in children. (See JAMES, below.)

The authors draw attention to the occurrence of malaria in cyclical waves. They do not believe that the peaks of malaria incidence are due to an abundance of mosquitoes, but ascribe them to variations in the immunity of the population. They point out that, in judging the value of any method of malaria control, it is necessary to determine in advance the natural trend of the malaria rate. The literature is full of reports of successes which were judged successes because malaria rates dropped after control measures had been instituted at the top of the peak of incidence.

The authors have found that "quinine provided without supervision of treatment, in the expectation that such a measure will reduce the malaria parasite rate among a native population, is a delusion and an indefensible waste of money."

[See this *Bulletin*, 1935, Vol. 32, p. 784, for authors' report on fourth year's observations.] *W. Fletcher.*

MONTESTRUC (E.). Le paludisme à la Martinique. [**Malaria in Martinique.**]—*Bull. Soc. Path. Exot.* 1936. Feb. 12. Vol. 29. No. 2. pp. 193-202. With 1 map.

Malaria in Martinique is a less serious disease than in many other islands of the Antilles. Europeans seldom suffer and blackwater fever is unknown. All three types of parasites have been found. The author found parasites in about 5 per cent. of 2,000 slides examined. He considers that it would be easy to control malaria because it is limited to certain parts of the island where it could be dealt with readily. *W. F.*

MORIN (H. G. S.), GASCHEN (H.) & NGUYEN-DINH-HAO. Recherches sur le paludisme des voies d'accès au plateau du Trân-Ninh. [**Malaria on the Routes to the Plateau of Tran-Ninh.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1935. Nov. Vol. 13. No. 9. pp. 1221-1246. With 4 figs & 1 chart.

Malaria at a high altitude.

Malaria is very severe, and blackwater fever is common at the military station of Nonghet, near the plateau. It is situated at an

altitude of 1,500 metres (nearly 5,000 feet), in about 19° north latitude. The carrier is *A. minimus*. The following anopheles were found at almost every station from the plains to the plateau: *A. minimus*, *A. maculatus*, *A. sinensis*, *A. jeyporiensis*. The authors conclude that the highlands have been contaminated by immigrants and soldiers who have come from hyperendemic areas. W. F.

GEAR (H. S.). **A Note on Malaria in China. The Chinese Medical Association Hospital Survey.**—*Chinese Med. Jl.* 1936. Feb. Vol. 50. No. 2. pp. 131–136. With 1 fig.

Twenty-five hospitals in provinces throughout China co-operated in returning records of all new patients treated both in ward and dispensary for the year 1934. The results can be taken as an indication of the seasonal incidence of malaria in China as a whole. Malaria patients apply for treatment throughout the year, the greatest numbers in the summer, from June to September, and the smallest numbers in January and February. Malaria accounted for 1.6 per cent. of all patients treated. Benign tertian was the commonest type of infection. All types occurred throughout China. Benign tertian had its peak in July, quartan in October, malignant tertian in November.

W. F.

STROMQUIST (W. G.). **Malaria Control in the Tennessee Valley.**—*Civil Engineering*. 1935. Dec. Vol. 5. No. 12. pp. 771–774. [Summary taken from *Public Health Engineering Abstr.* Washington. 1936. Feb. 29. Vol. 16. Signed J. A. LEPRINCE.]

This is a short discussion of the malaria problem of the Tennessee Valley in connection with the construction of four large lakes of irregular outline in a malarious territory. It is probably the best article written in recent years dealing with engineering phases of malaria problems connected with impounding of water on a large scale. The total shore lines to be cared for will approximate 2,500 miles. The writer gives a clear and concise idea of control procedure which will be of decided value to engineers on other large projects, both here and in other countries, and invites attention to the way in which the water power operating officials co-operate in malaria elimination. Better, quicker, and less costly methods of malaria control are desirable, and the author refers to experimental studies now being made towards these objectives. Three chart diagrams show the influence of water level fluctuation and anti-larval operations on anopheles production in the lakes. The information given covers up-to-date practice, and the experimental work and data being collected will be of decided future value.

EARLE (W. C.), PALACIOS (L. D.) & ARBONA (A.). **Methods used to control Malaria in Puerto Rico.**—*Puerto Rico Jl. Public Health & Trop. Med.* 1936. Mar. Vol. 11. No. 3. pp. 434–456. With 6 figs. [Spanish version pp. 457–478.]

Malaria here is best dealt with by permanent drainage carried out by engineers.

Malaria abounds in the main endemic centres of Porto Rico, because of natural conditions; it is not man-made. The most densely populated

parts of the island are the most malarious. The principal industry is the cultivation of sugar-cane; drainage favours this and, at the same time, limits the breeding of *A. albimanus*, the carrier. In the past, inspectors were sent to search out and treat cases of malaria. This, the authors think, was waste of money. Many of the people with parasites were not ill. "If every malaria patient with active symptoms could receive the few days' treatment necessary to relieve him of his attack, the greatest amount of good would be obtained at the least expense." *A. albimanus* breeds in almost any natural water deposit not too densely covered by vegetation. Larva-eating fish proved useless, minor drainage work and Paris green required too much supervision and were too costly; the authors came to the conclusion that permanent engineering methods such as subsoil drainage, flooding with sea water, etc., were necessary. Details are given of various ways of dealing with swamps by short-circuiting the rivers which feed them. "For the present, at least, the problem should be looked upon as one requiring a period of years for solution Most of the breeding areas can be permanently destroyed by various types of drainage operations; no matter how limited the resources, a little work of this type should be done each year." W. F.

BOGOJAWLENSKI (N. A.). Ueber friedliches Zusammenleben von Gambusien und Anopheleslarven in der Natur. [**Peaceful Symbiosis of *Gambusia* and *Anopheles* Larvae in Nature.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. May. Vol. 40. No. 5. pp. 201-203.

The observations were carried out in the spring and summer of 1935 in the district of Lenkoran, the most southern part of Azerbaijan. In the rice fields are many breeding places of mosquitoes. The vectors of malaria there are: *Anopheles maculipennis*, *A. hyrcanus*, *A. superpictus*, *A. pulcherrimus*, and *A. bifurcatus*, but *A. maculipennis* is the most important. The splenic index is 61 and the Ross index 3.4. *Gambusia*, the larvivorous top-minnow, is present in practically all the pools of water in Lenkoran, but, in spite of this, malarial mosquitoes are very numerous, not only in summer but also in winter. He considers that the simultaneous occurrence of these small fish and anopheles larvae is not accidental, but is a definite biological association. One cause of the failure of the *Gambusia* to attack the anopheles larvae is the enormous number of water plants in the streams. Not only did this vegetation hinder the fish from attacking the larvae, but it also afforded them abundant food in the form of animal and vegetable organisms, causing them to ignore the larvae as a source of food. The author's observation is not an isolated one, and others are quoted by him from the literature. So in Lenkoran they cannot expect any help from this antimalarial measure, although these small fish in other parts may be useful for the purpose.

E. D. W. Greig.

RYBINSKY (S. B.) & OVCHINNIKOV (M. M.). **Experiment on rearing *Gambusia* in Ponds near Kiev (Ukraine).**—*Riv. di Malariologia.* Sez. I. 1935. Vol. 14. No. 4. pp. 369-376. [22 refs.]

The fish died in winter when the ponds were covered with ice. *Gambusia affinis* was first brought to Russia in 1926; it flourished

in the Abkhasian subtropical climate and rendered oiling superfluous, so that in a single "tropical station the rearing of *Gambusia* curtailed by 200,000 roubles the expenses for the anti-malarial clearing of ponds." The extension of propagation in the colder northern districts therefore became important. Successful experiments were carried out at Odessa by PRENDEL and his colleagues, where the fish lived for 3 months under ice and multiplied well during the following summer. The authors therefore tried to breed them at Kief. *Gambusia* were put into pools in June 1933, and by October they had multiplied enormously. Some were then put into small ponds with stream water and subaquatic vegetation. In December, they could be seen swimming underneath the ice; the water temperature was 3°C.; the fish had food in their stomachs. By the following April all were dead; probably from lack of oxygen, shortage of food or the accumulating of toxic substances in the water, rather than from cold. The authors urge that the larva-destroying value of indigenous fish should be more thoroughly investigated. W. F.

DE CAMELIS (F.). La polinevrite malarica. (Contributo clinico.) [**Malarial Polyneuritis.**—*Riv. di Malarologia*. Sez. I. 1936. Vol. 15. No. 3. pp. 222-228. French summary (7 lines).

Polyneuritis is not a common complication of malaria. Its occurrence would appear to be determined by the intensity of the infection and certain climatic conditions. It often comes on gradually at the beginning of convalescence. The importance of making an early diagnosis is stressed so that specific treatment may be adopted forthwith. A typical case is described in detail. N. W.

DEBBASCH (G.), CALO (A.) & BURGARELLA (M.). Syndrôme nerveux aigu polymorphe chez une hérédo-spécifique au cours d'un accès pernicieux de paludisme.—*Tunisie Méd.* 1936. Jan. Vol. 30. No. 1. pp. 16-20. With 1 chart

CLEMENTS (F. W.). **A Papuan Field Experiment of Malaria Treatment.**—*Med. Jl. Australia*. 1936. Feb. 15. 23rd Year. Vol. 1. No. 7. pp. 235-237. With 1 map.

Fifty-one patients suffering from subtertian malaria were treated, approximately one half with quinine and the other half with atebirin. The drugs proved equally effective. The only by-effect was tinnitus in the quinine series. No observations were made as to the rate of relapse, nor would they have been of any value since the experiment was carried out in a hyperendemic area. W. F.

RAGIOT (Ch.) & MOREAU (P.). Deuxième série d'essais thérapeutiques d'une nouvelle formule à base d'alcaloïdes totaux suractives du quinquina. [**Treatment of Malaria with Cinchona Alkaloids.**—*Bull. Soc. Méd.-Chirurg. Indochine*. 1936. Apr. Vol. 14. No. 4. pp. 353-360.

A record of the treatment of three cases of malaria, one infected with *P. falciparum*, another with *P. malariae* and the third with *P. vivax*, with injections of the total alkaloids of cinchona, reinforced with additional hydrochlorate of quinine. The results were uniformly unsatisfactory. The preparation used was reported to have given

satisfactory results in Morocco. The authors remark that hyperendemic malaria of certain tropical countries, of which Cochin-China is one, is a much more serious disease and, at times, much more refractory to treatment, than is malaria in more temperate climates. They think that this fact may explain certain contradictory therapeutic results obtained in different parts of the globe. N. W.

MANSON (D.). **Tebetren Treatment in Malaria.**—*Records of the Malaria Survey of India*. 1936. Mar. Vol. 6. No. 1. pp. 19-25.

The number of cases treated was very small. The author's summary and conclusion are as follows :—

"Tebetren was tried in a series of 21 cases of malaria and the relapse rate was 14·3 per cent. Tebetren reduced the duration of the febrile period in malignant tertian malaria in comparison with quinine but had no advantage in benign tertian cases... No bad after-effects followed treatment with tebetren

"Tebetren is an advance on quinine in the chemotherapy of malaria and is worthy of further trial. The 'relapse-reinfection rate' is considerably reduced and toxic after-effects are absent." (See this *Bulletin*, 1935, Vol. 32, p. 387). W. F.

KNOWLES (R.). **Monkey Malaria.** [Correspondence.]—*Brit. Med. J.* 1935. Nov. 23. p. 1020.

The plasmodium which exists as a harmless commensal in the blood of the Malayan monkey, *Silenus irus*, produces a virulent infection when injected into the common Indian monkey *Silenus rhesus*. This letter is written to point out that this observation was first made by NAPIER and CAMPBELL (this *Bulletin*, 1932, Vol. 29, p. 700). They were examining the blood of an *irus* monkey (wrongly identified at the time as *Cercopithecus pygerythrus*) in connexion with the experimental transmission of kala azar, when they came across the malaria parasites accidentally. They inoculated three other monkeys with its blood, two *Silenus irus* and one *Silenus rhesus*, with the result that a fulminant attack occurred in the *rhesus*. The strain was then handed over to Colonel Knowles's laboratory where the experiments were carried out which were summarized in this *Bulletin*, 1932, Vol. 29, p. 701, and in later numbers. W. F.

NAUCK (E. G.) & MALAMOS (B.). Ueber die Wirkungsweise der Malariaheilmittel bei Affenmalaria. (*Pl. knowlesi*.) [**Mode of Action of Antimalarial Drugs in Monkey Malaria.**]—*Klin. Woch.* 1936. June 20. Vol. 15. No. 25. pp. 888-891. [26 refs.]

An experimental study of antimalarial drugs in monkeys infected with *P. knowlesi*.

Monkeys received, half an hour after intravenous injection of atebirin or quinine, an intravenous injection of blood containing large numbers of *P. knowlesi*. Immediately following the injection parasites could be observed in the peripheral blood. Shortly after the contact of the parasites and the drugs morphological changes were noted in the former. The alterations produced by quinine and atebirin were different. In the case of the latter a solution of the parasite occurred whilst in the case of the former solution rarely occurred, usually a

thickening and shrinking of the protoplasm, which stained more intensely.

The occurrence of these morphological changes in the treatment of animals, in which the reticulo-endothelial system was intact, and in animals after splenectomy and blockade of the r.-e. system, must be interpreted as a *direct* action of the drug on the parasite.

E. D. W. Greig.

CHOPRA (R. N.) & MUKHERJEE (S. N.). **The Trend of Immunity Studies in Malaria.**—*Indian Med. Gaz.* 1933. Jan. Vol. 71. No. 1. pp. 34–39. [36 refs.]

A general review of the mechanism of immunity in malaria.

KRISHNAN showed that acquired immunity in monkeys belonging to susceptible species was generally associated with latent infection, but in resistant species immunity often occurred without this. In birds, on the other hand, immunity disappears if the latent infection is cured. (See this *Bulletin*, 1934, Vol. 31, pp. 179 and 463). TALIAFERRO found that the serum of immune birds did not protect normal birds. CANNON and TALIAFERRO (this *Bulletin*, 1931, Vol. 28, p. 494; 1933, Vol. 30, p. 726; 1935, Vol. 32, p. 425) showed that immunity in birds is cellular and consists of an increased rate of phagocytosis by the reticulo-endothelial system. They believed that the macrophages were stimulated by some opsonic antibody. BECHOLD demonstrated that the negative charge of bacteria is reduced when they are sensitized by an immune serum, and it is evident that both agglutination and phagocytosis resemble the coagulation of colloids where charged particles, on the reduction of their electric charge, approach one another and conglomerate. BROWN and BROOM (this *Bulletin*, 1933, Vol. 30, p. 830; Vol. 31, p. 352) showed that the electric charge on red cells was reduced in malaria and that this reduction promoted phagocytosis. Serum from an immune bird reduced the charge on cells from a normal bird; but this action was non-specific, because the serum also reduced the charge on cells from any species of animal and even on bacteria. BROWN noted the charge-reducing action of the globulins in the serum and this fraction is increased in malaria. Although the existence of specific antibodies has not been directly demonstrated, indirect evidence from an analogy of the physical and serological behaviour of blood in both malarial and bacterial infections has been brought forward in support of this view. Chopra and his colleagues (this *Bulletin*, 1934, Vol. 31, p. 179), have found that the charge on infected cells is lower than that on healthy cells. In the ring stage of the parasite, the charge is slightly higher than normal; in the mature stage, it is much lower. It has recently been found that changes in the plasma are perhaps more important than the electrical charges on the individual cells and "the question of artificially inducing such alterations in the blood may come up for consideration for the purpose of promoting immunity against this disease." (See this *Bulletin*, 1933, Vol. 30, p. 827.) W. F.

MOCHKOVSKI (Ch.). Les relations entre l'hôte et le parasite dans le paludisme. Considérations générales sur l'immunité et la virulence. (Premier mémoire).—*Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 274–279.

BOYD (Mark F.) & STRATMAN-THOMAS (W. K.). **The Transmission of Quartan Malaria through Two Consecutive Human-Anopheline Passages.**—*Amer. Jl. Trop. Med.* 1936. Jan. Vol. 16. No. 1. pp. 63-65.

The author has already reported (this *Bulletin*, 1933, Vol. 30, p. 853) the successful transmission of two strains of *P. malariae* by means of *A. quadrimaculatus*; he now reports the further passage of one of these strains to a second series of patients by means of *A. quadrimaculatus* infected by feeding on one of the 3 patients in the first series. Scanty gametocyte production in the second series did not permit further passage by mosquitoes. All the attacks began as quartan intermittents, and subsequently showed a tendency to become double quartan, and later triple quartan or quotidian. W. F.

BOYD (Mark F.) & KITCHEN (S. F.). **The Comparative Susceptibility of *Anopheles quadrimaculatus*, Say, and *Anopheles punctipennis*, Say, to *Plasmodium vivax*, Grassi and Feletti, and *Plasmodium falciparum*, Welch.**—*Amer. Jl. Trop. Med.* 1936. Jan. Vol. 16. No. 1. pp. 67-71.

Anopheles quadrimaculatus and *A. punctipennis* proved to be approximately equally susceptible to both strains of *P. vivax* employed in these experiments; but, while *A. quadrimaculatus* was susceptible to all the strains of *P. falciparum* employed, *A. punctipennis* was very susceptible to some and quite resistant to others. The capture of wild *A. punctipennis* with a gland infection has never been reported, and only a single instance of a stomach infection has come to notice, "it does not appear likely, despite its susceptibility, that it is a factor of any consequence in the propagation of malaria parasites." W. F.

BOYD (Mark F.), STRATMAN-THOMAS (Warren K.) & KITCHEN (S. F.). **On Acquired Immunity to *Plasmodium falciparum*.**—*Amer. Jl. Trop. Med.* 1936. Mar. Vol. 16. No. 2. pp. 139-145.

Homologous immunity, but no heterologous immunity, follows infection with *P. falciparum*.

Recovery from infection with *P. vivax* is followed not only by immunity to the same strain but also by a very definite though less effective immunity to other strains. On the other hand, a patient who has recovered from an attack of subtertian malaria, even though he still has parasites in his blood, is not immune to a heterologous strain, and inoculation with such a strain will produce an attack which may be as severe as the first. *P. falciparum*, however, produces homologous immunity; that is to say, re-inoculation with the same strain will not result in a second attack though it may result in a slight increase of the parasites in the blood. This homologous immunity lasts about four months after the infection appears to have been eradicated. W. F.

BOYD (Mark F.), STRATMAN-THOMAS (W. K.) & KITCHEN (S. F.). **On the Duration of Infectiousness in Anophelines harboring *Plasmodium falciparum*.**—*Amer. Jl. Trop. Med.* 1936. Mar. Vol. 16. No. 2. pp. 157-158.

The infectiousness of mosquitoes with *P. falciparum* deteriorates much more rapidly than their infectiousness with *P. vivax*. After

the mosquitoes used in these experiments had matured their infection with *P. falciparum* the authors stored them in a Frigidaire, between 3° and 14°C. They found that nearly every person became infected who was bitten by these mosquitoes during the first 10 days. Subsequently, the effectiveness of the mosquitoes declined rapidly, and no inoculations were successful when more than 40 days had elapsed after the completion of the extrinsic incubation period (this *Bulletin*, 1934, Vol. 31, p. 701). W. F.

BOYD (Mark F.), KITCHEN (S. F.) & MULRENNAN (J. A.). **On the Relative Susceptibility of the Inland and Coastal Varieties of *A. crucians*, Wied., to *P. falciparum*, Welch.**—*Amer. Jl. Trop. Med.* 1936. Mar. Vol. 16. No. 2. pp. 159–161.

ROOT has shown that there are two strains or varieties of *A. crucians*—a coastal and an inland strain, indistinguishable as adults, but differing as larvae. The authors found no difference in their relative susceptibility to *P. falciparum* but they proved to be poor hosts in comparison with *A. quadrimaculatus*. W. F.

RAMSAY (G. C.), CHANDRA (S. N.) & LAMPRELL (B. A.). **A Record of an Investigation to determine the Anophellic Indices of Certain Anopheline Mosquitoes collected on Tea Estates in Assam and Northern Bengal.**—*Records of the Malaria Survey of India.* 1936. Mar. Vol. 6. No. 1. pp. 49–52.

Infectivity surveys comprising 100,000 dissections have shown that *A. minimus* constitutes 98·3 per cent. of the specimens infested with malaria. The precipitin test shows that this mosquito is highly anthropophilic. *A. leucosphyrus* also prefers human blood but the authors have not found it acting as a vector. It was not prevalent in the area under investigation. Out of 622 *A. minimus*, 85 per cent. contained human blood; of 102 *A. leucosphyrus*, 75 per cent., of 311 *A. kawari* 16 per cent. Less than 10 per cent. of the following contained human blood: *A. maculatus*, *A. hyrcanus*, *A. kochi*, *A. subpictus*, *A. annularis*, *A. vagus*, *A. splendidus*. W. F.

VOLLMER (Ortrud). Kleiner Beitrag zur Kenntnis der Verbreitung der Anopheles im Rheinland. [**Distribution of Anopheles in the Rhine District.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1936. June. Vol. 40. No. 6. pp. 255–259. With 1 fig.

The author was very surprised at finding that not one courtyard investigated in the Rhine and hill districts between Elberfeld and Düsseldorf, also in Cleve, Uedem and Geldern, was without Anopheles. The Anopheles were found in the cattle and pig stalls; they preferred dry, dark, sheltered corners. He noted three races of *Anopheles maculipennis*, viz., var. *atroparvus*, var. *messeae* and var. *typicus*. He describes the eggs of these three varieties as, "halfgrey," "dark" and "striped."

The author considers the question of "anophelism sine malaria" in Germany an important one, and hence the necessity for accurate knowledge of the distribution of their Anopheles.

E. D. W. Greig.

SEPULCRI (Piero) & DE NEGRI (Ugo). Osservazioni sull'anofelismo nel delta del Po e zone limitrofe. [**Anophelines in the Po Delta and its Vicinity.**—*Riv. di Malarologia*. Sez. I. 1936. Vol. 15. No. 3. pp. 198-206. With 6 figs. on 1 plate & 1 map. French summary (4 lines).

This is the report of an anopheline survey of the Rovigo Province, which contains the Delta of the Po. Systematic captures made in twenty-four localities show that in the coastal belt *A. elutus* very largely predominates. Further from the sea *typicus* and *messeae* are chiefly in evidence. Certain abnormalities of egg structure were noted.
N. W.

RAFFAELE (G.) & LEGA (G.). L'anofelismo nella piana di Rieti. Nota preventiva. [**Anophelism in the Rieti Plain.**—*Riv. di Malarologia*. Sez. I. 1936. Vol. 15. No. 1. pp. 23-31. With 5 figs. (1 map). English summary.

The Plain of Rieti lies at the foot of the Sabini mountains, around the Lakes Lungo and Ripasottile, and about 400 metres above sea level and has a radius of about 6 kilometres. Anopheles abound there, *A. maculipennis*, the *messeae* variety predominating, but *A. m. typicus* and *A. m. melanoon* are also found, in the period from May to October. Thus, of 400 egg deposits examined 372 were *messeae*, 18 *typicus* and 10 *melanoon*, or 93, 4.5 and 2.5 per cent. respectively. One hundred and eighty-eight mosquitoes were tested by the precipitin method to determine their feeding source—whether cattle, horse, pig, sheep, or man. Of these 29.8 per cent. gave reactions for cattle and man, next 22.3 for cattle only, sheep and pigs were equal—6.3, man only 5 and horse 2 per cent. It will be seen that just over 36 per cent. had fed on man. The inhabitants of the district number nearly 5,000. In spite of the prevalence of Anopheles there is said to be no human malaria.
H. H. S.

BEZERRA (ACTISIO). Transmissores da malaria no Brasil. *Folha Med.* 1936 Jan. 5. Vol. 17. No. 1. pp. 4-7.

MATHIS (C.). Elevage d'*Anopheles gambiae* à Paris. [**Breeding *A. gambiae* in Paris.**—*C. R. Soc. Biol.* 1936. Vol. 121. No. 1. pp. 21-22.

The author has bred these Anopheles successfully in his Paris laboratory from specimens imported from the West Coast of Africa. They are now in their 6th generation. They are harder to breed than in the tropics. The water for the larvae was aerated with a pump such as is used for amateurs' aquarium tanks. Glass rods are put in the vessel in order to prevent air bubbling violently through the water. When the temperature is very cold the water is kept warm. The larvae are fed on *Chlamydomonas* sp., *Chlorella vulgaris* and a *Pleurococcus*. The adults, which copulate readily in a small space, are fed on guinea-pigs, or on human volunteers, and are kept in cages covered with a damp cloth.
W. F.

WANSON (M.). Influences de la salinité sur la faune culicidienne. [**The Influence of Salinity upon Mosquito Breeding.**]—*Ann. Soc. Belge de Méd. Trop.* 1935. Dec. 31. Vol. 15. No. 4. pp. 587–598.

The author has found that the *Anopheles* of Banana (*A. gambiae* is the only species) consist of two groups, long-wings and short-wings. The short-wings come from the crab-holes and small tidal pools, where the amount of water is small and the concentration of larvae and waste products high. The long-wings come from the big marshes. *A. gambiae* in the laboratory deposited eggs in water containing as much as 60 grams of chlorine per litre, but not in that containing 80 grams. The favourite concentration was up to 25 grams. The larval cycle, in nature, was habitually completed at concentrations between 15 and 40 grams per litre, and sometimes in concentrations as high as 55.41 and even 61.20 grams. In the higher concentrations, development was delayed and the imagoes were smaller than normal. W. F.

TREILLARD (M.). La biologie des espèces anophéliennes du groupe *minimus-funestus* et son utilisation pratique. A propos de récentes expériences. [**Biology of Species of the *minimus-funestus* Group of *Anopheles*.**]—*Bull. Soc. Path. Exot.* 1936. Apr. 1. Vol. 29. No. 4. pp. 396–402.

The author is anxious to make better use of existing knowledge of the biology of *Anopheles minimus*. He contrasts it with its near relations of the *funestus* group in South Africa.

In the author's experience in Annam and Cochin China, *A. minimus* is often numerous in houses, it is apparently very long-lived, and it is known that it prefers the blood of man, so that without doubt it is one of the major carriers of malaria. The natural breeding places are often scattered and difficult to discover, so that control by any larvicidal method may be incomplete and expensive. The view is put forward that it would be worth while to attempt to control the insect by killing adults in houses by insecticidal sprays used once a week. It does not appear that this has been carried out in the countries in which the author has worked, but, as he points out, DE MEILLON and PARK ROSS in South Africa appear to be convinced that measures should in practice be directed against the adult *funestus* rather than the larva.

P. A. Buxton.

DE MEILLON (Botha). *Anopheles funestus* Giles and *Anopheles lesoni* Evans in Human Habitations and Outdoor Haunts.—*Ann. Trop. Med. & Parasit.* 1936. Apr. 8. Vol. 30. No. 1. pp. 1–2.

The critical discrimination of the females of *Anopheles funestus* and *lesoni* is a matter of great difficulty, which the author overcomes by selecting only those which are gravid and identifying them by the structure of the unlaid eggs. This of necessity limits the number of specimens capable of critical identification, and it might introduce a source of error if the females of one species entered houses and took human blood, but left the house before the eggs had matured.

The figures here published appear to show that the proportion of *funestus* infected with *Plasmodium* is considerably higher among those caught in houses than in those caught out of doors; also that *leesoni* is rarely caught in houses. As tests for significance have not apparently been employed it is not easy to know how much reliance can be placed upon the published figures, the amount of material available being at present rather small.

P. A. B.

- i. WEYER (Fr.). Ueber den Cl-Gehalt und das pH verschiedener Brutgewässer von *Anopheles maculipennis* in Norddeutschland und die Beziehungen zur Rassenfrage. [**The Cl-Content and the pH of Various *Anopheles maculipennis* Breeding Places in North Germany, and their Relation to the Racial Question.**]—Reprinted from *Arch. f. Hydrobiologie*. 1934. Vol. 27. pp. 595–608. With 3 figs. [13 refs.]
- ii. MARTINI (E.). Ueber den Salzgehalt der Gewässer und die Malaria-lage. [**The Salinity of Bodies of Water in Relation to Malaria.**]—Reprinted from *Entom. Beihefte Berlin-Dahlem*. 1934. Aug. 7. Vol. 1. pp. 28–44. With 3 figs.

i. In the *Anopheles* region of North Germany, especially in E. Friesland, Neuwerk I., the Elbe marshes, Mecklenburg and on the Pomeranian coast, numerous *A. maculipennis* breeding places were investigated as regards their Cl-content and the pH. In typical breeding places in E. Friesland (usually small pools for watering cattle, 5–10 metres in diameter, with overgrown banks), the Cl-content varies from 0.034 to 0.661 per cent., and the pH from 6.8 to 8.2 per cent. In Mecklenburg in certain places the Cl-content is as high as 3.0 per cent. As regards the area occupied by the race *atroparvus* in Germany and in Holland, the Cl-content of breeding places is on the average considerably lower in the former than in the latter. In the part of North Germany where this race occurs, the water in the breeding places is very often fresh. Eggs of *atroparvus* were frequently observed on fresh water pools, and conversely in certain cases eggs of the race *messeae* were found on water the Cl-content of which was high (brackish water). The same fresh and brackish water pools also yielded eggs of the *typicus* race. In the course of the year the Cl-content of a body of water, probably as a result of climatic conditions, varies considerably. There is no strict correlation between the presence of a given race and the Cl-content of the breeding places, but hitherto the race *messeae* exclusively has been found only in fresh water districts, while brackish water is a preferred medium in the case of *atroparvus*. Since, however, *atroparvus* larvae are very frequently met with in fresh water also, this race, as regards its oecology, shows itself to be more labile and adaptable than *messeae*. A reliable deduction as to the racial character of an *Anopheles* population cannot be based solely on the Cl-content of the breeding places.

ii. After a general discussion, chiefly concerning the differences between the races (or species?) *A. maculipennis atroparvus* and *A. m. messeae*, and their local occurrence in Germany and other parts of Europe, the author settles down to the real problem, namely conditions in the Danube delta, some light on which is thrown by the following percentages, quoted from ZOTTA.

Pruth Valley, near Galatz, absolute malaria index 35 ;

Danube Valley, between Galatz and Tulcea, absolute malaria index 27 ;

Danube Delta, below Tulcea, absolute malaria index, 6.

In the Danube Delta the rare *messeae* occurs almost exclusively ; further south, where a broad sandy tract separates Delta and sea, *atroparvus* is found. In the Danube villages, despite the fact that they are infested solely by *messeae*, malaria-indices are very high ; more than 60 per cent. of the school children show signs of the disease, and the idea that *under no circumstances* can *messeae* be responsible for malaria endemics must therefore be abandoned. On the other hand this by no means amounts to proof that, as a vector of malaria, it is *just as efficient* as *atroparvus*. Nevertheless, shortly after the War a wave of malaria swept over a great part of Rumania, including the Delta, which had largely been deprived of the protection afforded by cattle, and throughout the Danube area, whether severely or slightly attacked, *messeae* is practically the only race of *Anopheles* that occurs.

The lowness of the malaria rate in the Danube Delta is possibly due in the first place to the well-nourished condition of the population, children included. A second factor is, somewhat paradoxically, the abundance and bloodthirstiness of mosquitoes, especially *Mansonia richardii*, which breeds in the reed swamps in myriads, and whose attacks, combined with those of other species, cause the universal use of mosquito nets. Thirdly, about four times as many cattle are kept in the Delta as in other parts of Rumania, so that deviation of *Anopheles* thereby is correspondingly greater. The relative sparseness of the population, and the fact that summer temperatures in the Delta are lower than those elsewhere in Rumania must also be taken into account, and all this goes to show that in the Danube Delta the race of *Anopheles* is not in itself the decisive factor.

When searching for a purely *atroparvus* area in the Dobrudja, near Constanza, where there are brackish water lakes behind the coast line, the author found a solitary cottage, which, with a well-filled cemetery, was the sole remains of a village otherwise obliterated by malaria. The local mosquito, however, proved to be *A. clutus*, which is also responsible for the existence of severe malaria along the coast to the south, and has experimentally been shown to be especially resistant to salt water, even more so than *atroparvus*. That in the *A. maculipennis* group the more dangerous forms appear to display this resistance can hardly be fortuitous. The wide distribution of *Aedes salinus* and *A. caspius*, two salt-fast species found along the shoreline from the Mediterranean to Scandinavia, would seem to show that ability to breed in salt water is of advantage in the struggle for existence. The development of the malaria germs depends upon the warmth of the environment, and the importance of the races of *A. maculipennis* from the point of view of malaria must vary with their temperature-constants and the localities that they prefer ; if the salt-faster forms are also the heat-faster, there must, as was believed by GRASSI and older German physicians, be some connexion between brackish water and the degree of danger from malaria. This being so, free irrigation with fresh water, coupled with good drainage, will afford an entirely new method of malaria-prophylaxis in *A. maculipennis* regions, and will curb the activities of the dangerous anopheline races. E. E. Austen.

EVANS (A. M.). **Notes on Anophelines. I.—Description of *Anopheles marshalli* var. *gibbinsi* from Uganda. II.—The Characters of *A. maculipennis* var. *messeae* in Wirral, England.**—*Ann. Trop. Med. & Parasit.* 1935. Dec. 18. Vol. 29. No. 4. pp. 469–473. With 1 fig. [12 refs.]

I. The variety of *A. marshalli* here described as var. *gibbinsi* var. nov. while, in the adult female, very similar to the typical form as found in the Transvaal, exhibits certain structural differences in the terminalia of the male, and also in the egg, larva and pupa. In Uganda, as already shown by GIBBINS, "this variety is a common house-frequenter and an important vector of malaria at Fort Portal."

II. In 1934 the author noted the presence at Wirral of a form of *A. maculipennis* which, as regards egg- and hibernation-characters, agreed with var. *messeae* as described by continental writers. After studying further material from Wirral, including larvae and males raised from eggs, the following conclusion is reached :—

"The form of *A. maculipennis* studied in Wirral, Cheshire, is evidently morphologically almost identical with the Dutch form of var. *messeae*. The behaviour during hibernation is of the same general type as in Dutch *messeae*, although there appears to be greater variation in reaction to experimental conditions, and the period of complete hibernation may terminate on a somewhat earlier date. The variable reaction to experimental conditions supports the suggestion made by Professor SWELLEN-GREBEL (*in litt.*, December 22nd, 1934) that the occurrence of normal digestion and precocious ovulation as early as December may indicate a biological difference between the forms of *messeae* occurring in Holland and Wirral, England."

E. E. A.

HACKETT (L. W.) & LEWIS (D. J.). **A New Variety of *Anopheles maculipennis* in Southern Europe.**—*Riv. di Malariologia.* Sez. I. 1935. Vol. 14. No. 5. pp. 377–383. With 1 plate. [6 refs.]

On the Mediterranean coast of Spain, as also in North-West Italy, Albania, and apparently in parts of Yugoslavia and Macedonia, there occurs a variety of *A. maculipennis* not yet recorded as found in Northern Europe, and, on the basis of egg, larval and adult characters, described in this paper as *A. maculipennis subalpinus* var. nov. As regards the main points of difference exhibited by this latest addition to an already formidable list, it seems that in the egg which is heavily barred :—"The floats always have a glossy appearance due to the absence or scarcity of intercostal ridges. It is this appearance rather than the actual presence or absence of ridges which distinguishes eggs of *subalpinus* from those of *messeae* and *typicus*, which always appear frosted." In the larva, there is a considerable difference between *subalpinus* and *messeae* in the "average number of branches of the antepalmate hair on the fourth and fifth abdominal tergites," and in the former this number is "higher than in *typicus*." In the male hypopygium, as shown by Albanian specimens, differences, as compared with conditions in *messeae* and *typicus*, are exhibited by the external spine of the harpago. The adult female, on the other hand, agrees in colour with that of other races.

"In Albania *subalpinus* is almost always the dominant race of *maculipennis* in stables near fresh water marshes. . . . Near Korça it oviposits like *messeae*, in open sheets of water and not in ditches."

E. E. A.

SERVAJEAN (Constant). Anophélisme sans paludisme. Le problème des races de l'*Anopheles maculipennis*.—97 pp. With 3 figs. & 1 map. [Bibliography.] 1935. Algiers: Imprimerie Nord-Africaine (S. Crescenzo).

SERGEANT (Et.) & CATANEI (A.). Influence du froid sur les oeufs d'*Anopheles maculipennis* du littoral algérien. [The Influence of Cold on the Eggs of *A. maculipennis* on the Coast of Algeria.]—*Arch. Inst. Pasteur d'Algérie*. 1935. Dec. Vol. 13. No. 4. pp. 511-512. With 1 chart.

The experiments were carried out with the eggs of *Anopheles* caught in the neighbourhood. They were oviposited at a temperature of 25°C. and were exposed at once to a temperature of 5°C., in which they were kept for varying periods of 1, 2, 3, 4, 5 and 6 days, before being transferred to the optimum temperature of 25°C. The period of incubation of control eggs left at this temperature was one or two days. The incubation period was lengthened in proportion to the length of exposure to the low temperature; after 3 days' exposure it was about 3 days, after 7 days it was 7 days; after 10 days' exposure very few eggs hatched; after 14 days, they were all sterilized. W. F.

TOUMANOFF (C.) & HU (S. M. K.). Sur le comportement trophique d'*Anopheles hyrcanus* var. *sinensis* dans la région de Shanghai. [Food Preference of *A. hyrcanus* in the Neighbourhood of Shanghai.]—*Bull. Soc. Path. Exot.* 1935. Nov. 13. Vol. 28. No. 9. pp. 832-835.

A. hyrcanus var. *sinensis* is the only *Anopheles* in the district of Kiaochow; it is most numerous in stables, pigstyes and cowsheds where 97 per cent. contain animal blood. Nevertheless, there is always a little malaria, and, by means of investigations with mosquito traps, the authors found that the greatest amount occurred when the density of *Anopheles* was at its highest point. Precipitin tests showed that 95 per cent. of those caught in houses contained human blood, and 99 per cent. of those caught in cowsheds contained bovine blood. It appears that *A. hyrcanus* remains fixed in the neighbourhood of the stable or dwelling where it has first fed. At the time of greatest anopheline density, though most of them enter stables and remain there, a few enter human dwellings where they feed and remain.

W. F.

WALCH (E. W.) & WALCH-SORGDRAGER (G. B.). The Eggs of Some Netherlands-Indian Anophelines.—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië*. 1935. Vol. 24. No. 3. pp. 73-85. With 14 figs. on 2 plates.

The problem of racial differentiation as exhibited in Europe by *Anopheles maculipennis* may have its counterpart in the Oriental Region, where, for instance, *A. subpictus* is a malaria-carrier in the Dutch East Indies but not in British India, while, in different parts of the former, "*A. hyrcanus* (and its varieties) and *A. aconitus*" behave similarly. Devoting themselves at the outset to a morphological study of the eggs, the authors have been able to compare material from different parts of Java and Sumatra with the descriptions and figures of eggs of Indian anophelines published in 1931 by CHRISTOPHERS and BARRAUD. In the present paper detailed descriptions of or

notes on the eggs of the following species and varieties are given :—*A. hyrcanus* var. *nigerrimus* ; *A. barbirostris* ; *A. albotaeniatus* ; *A. tessellatus* ; *A. kochi* ; *A. punctulatus* ; *A. annularis* ; *A. annularis* var. *philippinensis* ; *A. maculatus* ; *A. aconitus* ; *A. vagus* ; *A. sundaicus* ; and *A. subpictus*.

In certain cases, as in the eggs of *A. vagus* and *A. subpictus*, noticeable differences from Indian specimens were found. In Java, *A. subpictus* breeds in salt or brackish as well as in fresh water, with a corresponding difference in the number of ribs in the egg-floats ; as regards the larval stage, the clypeal hairs would seem very often to be straight in the former and branched in the latter case. E. E. A.

WALCH (E. W.) & WALCH-SORGDRAGER (G. B.). Over de morphologische eigenschappen van verschillende subpictus eieren. [Structural Differences in Eggs of *A. subpictus*.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1936. Feb. 18. Vol. 76. No. 7. pp. 394–422. With 5 graphs & 3 plates. English summary.

The paper discusses structural differences in eggs of *Anopheles subpictus* (*rossi*), laid in fresh and salt waters in Java.

In Java this mosquito breeds in waters exhibiting a wide range of salinity, up to about 2.49 per cent., a figure which approaches that of sea water. The eggs from fresh and salt waters fall broadly into two types, and seven points of difference are enumerated. But both in fresh and in salt water a considerable amount of variation occurs, and it seems that an egg may appertain clearly to one type in most of its characters, but to the other type in one or two of them. The fineness or coarseness of the columellae on the dorsum, which makes a great difference to the appearance of the egg, seems to be one of the less reliable characters. One is left with the impression that the most constant points of difference are :—

		Salt water.	Fresh water.
Average no. of ribs in float	...	Under 19	Over 21
Length of float/length of egg	...	About 0.5	About 0.6

These numerical characters are carefully discussed, standard deviations of means being given.

The authors suggest that perhaps two definite races exist, which produce hybrid intermediates in certain areas. The possibility occurs to the reader that the differences observed are due to some unidentified physico-chemical cause other than salinity, and that the solution of the problem may lie rather in the laboratory than the field. P. A. B.

- i. RAYNAL (J.) & GASCHEN (H.). Méthode des précipitines appliquée aux anophèles. Résultats en Indochine-Nord.—*Bull. Soc. Path. Exot.* 1935. Dec. 11. Vol. 28. No. 10. pp. 937–943.
- ii. TOUMANOFF (C.). L'épreuve des précipitines appliquée à l'étude des habitudes trophiques chez quelques culicines d'Extrême-Orient. [The Food of Mosquitoes in Northern Indo-China as determined by the Precipitin Test.]-*Ibid.* pp. 943–948.

Both papers report results obtained by applying the precipitin reaction to the blood found in stomachs of mosquitoes in Indo-China.

i. The authors applied their test to individuals of sixteen species of *Anopheles*, but the figures for many species are small and there are only seven species on which a hundred or more tests were performed.

It was shown that the members of all these seven species feed to some extent on animals, *hyrcanus*, *vagus* and *aconitus* to a large extent ; only *minimus* and *jeyporiensis* appear to feed more upon man than upon animal. Work in other directions has already shown that these species in particular frequent houses and that they are most commonly found infected with plasmodium (for instance 3.69 per cent. of 4,488 *minimus* contained sporozoites). The precipitin test may therefore be said to confirm previous work in other directions.

ii. The paper reports tests carried out on common domestic Culicines, nearly all of them *Culex fatigans*, *Aedes aegypti* and *A. albopictus*. The total numbers were not very high but the conclusion is reached that these species specialize much more in man's blood than does any of the *Anopheles* species in the locality. Indeed even when they are taken in stables it is frequently found that the Culicines have been feeding upon a human being. The following figures, for instance, are quoted : 96 positive reactions were obtained for *Culex fatigans* taken from houses and in each case the blood was human : 72 positive reactions were obtained from individuals from stables, and of these 61 had fed on man, 11 on buffalo.

P. A. B.

SHUTE (P. G.). **Agglutination of the Red Blood-Corpuscles of Man, Animals and Birds by the Salivary Glands of *Anopheles maculipennis*.**—*Jl. Trop. Med. & Hyg.* 1935. Nov. 15. Vol. 38. No. 22. pp. 277-278. With 6 figs.

The gland juice of *A. maculipennis*, var. *atroparvus* and *messeae*, agglutinated the blood corpuscles of man, animals and birds. The salivary glands of *A. claviger*, *A. plumbeus*, and 8 species of *culex* produced no agglutination. The glands of male *maculipennis* caused no agglutination.

W. F.

STRICKLAND (C.) & ROY (D. N.). **Experimental Malarial Infection of *Anopheles subpictus* Grassi (*A. rossii* "type" Giles).**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1936. Feb. 18. Vol. 76. No. 7. pp. 387-393. [12 refs.]

A. rossii were fed on persons infected with malaria. The following numbers of mosquitoes were subsequently dissected : 143 which had fed on subtertian cases, 49 which had fed on benign tertian, 29 which had fed on quartan. No gland infections were found, but among the mosquitoes fed on the subtertian cases zygotes were found in two and black spores in four. The authors conclude that this mosquito "has a very low infection rate with malarial plasmodia in Calcutta, even when *A. stephensi*, used as a strict control, is becoming infected at the rate of nearly 100 per cent." They suggest that the high rates of infection obtained by SOESILO and some other workers may have been due to the use of a subspecies of *A. rossii* in their experiments.

W. F.

NEOGI (Sushil Kumar). **Study of the Bionomics of *Anopheles sundanicus* (*A. ludlowi*) in the Salt Lakes of Calcutta.**—*Records of the Malaria Survey of India.* 1936. Mar. Vol. 6. No. 1. pp. 31-47. With 1 map & 2 charts.

The author discusses the factors which might account for the spread of *Anopheles sundanicus* (*ludlowi*) during recent years in the immediate vicinity of Calcutta.

It has been feared for a good many years that the Salt Lakes, an area of many square miles of saline swamp immediately east of the city of Calcutta, might become an important breeding place of this dangerous species of *Anopheles*, but it was only in December 1932 that the insect began to be numerous. The author endeavours to define some of the conditions prevailing in the breeding places, hoping to discover the cause of the mosquito's increase. As the species is well known to breed in brackish water he gave attention first to salinity, which was determined in 863 samples in which larvae were also found. It is clear from the figures that the species generally breeds in a water of rather low salinity, 60 per cent. of the findings being associated with salinity less than 150 parts per 100,000: but occasionally larvae are found in water the salinity of which approaches that of sea water. It would perhaps have added to the value of the work had the author examined the salinity in a number of spots which appeared suitable but from which larvae of this insect were absent. Rather similar figures are tabulated for the albuminoid ammonia and for the plants found in association with larvae: also for the mean shade temperature during the months of the investigation. The author devotes some attention to the statistical side of the work and uses correlation and partial correlation to assist him.

An interesting paper is brought to an end by a discussion of the general problem which has so recently arisen and become pressing. Evidence of several sorts leads to the view that, owing to natural alterations in certain river channels, the Salt Lakes are now less salt than they were. This in turn appears to suggest that the change which is in progress might go further and lead to the replacement of this species by some other, breeding in fresher water. The problem in fresh-water biology is a fascinating one apart from its practical interest.

P. A. B.

MISSIROLI (A.). Sulle caratteristiche termiche dei focolai di *Anopheles plumbeus*. II Nota. [Thermal Characteristics of Breeding Places of *A. plumbeus*.]—*Riv. di Malariologia*. Sez. I. 1935. Vol. 14. No. 6. pp. 449-456. With 3 figs. English summary (8 lines).

Following up work recorded in a previous note (this *Bulletin*, 1935, Vol. 32, p. 807) the author has studied the optimum temperature for development of larvae of *A. plumbeus* and the relations between rate of development and vitality and deduces therefrom their seasonal prevalence and area of distribution. He found that the larvae, thriving when maintained at 16°-18°C., died in a thermostat at 24°C. Comparing the breeding sites of this species with those of *A. maculipennis* he found that the daily variations of temperature of the former were very little, while those of the latter might be as much as 10° higher. On such a basis he divides anophelines into two large groups; one whose development is favoured by a temperature nearly constant, and the other favoured by oscillating temperatures. Thus *A. m. labranchiae* develops mostly in May and June and the optimum temperatures of its breeding sites oscillate between 15° and 25°C., *A. m. elutus* prefers a somewhat higher temperature, while *A. m. typicus* develops most quickly in water subject to less wide oscillations of temperature. These facts may, he believes, play a considerable part in the seasonal prevalence of the different species. Further researches on these matters are to be made in the laboratory and in the field.

H. H. S.

PURI (I. M.). **Schematic Table for the Identification of the Indian Anopheline Mosquitoes. Part I. Adults. Part II. Full-grown Larvae.**—*Records of the Malaria Survey of India*. 1935. Sept. Vol. 5. No. 3. pp. 265–268, with 1 folding chart; 269–273, with 1 folding chart.

Stimulated by the recent publication by TREILLARD of a combination of synoptic table and diagram, for the rapid determination of the twenty-one species of *Anopheles* found in Indo-China (see this *Bulletin*, 1935, Vol. 32, p. 438), the author has produced the present tables wherein similar conventional representations of diagnostic characters are employed. Unhappily, "The number of species of Anopheline mosquitoes occurring in India is . . . more than double that found in Indo-China," with the result that the postcard size, which was sufficient for TREILLARD's table, is far exceeded by Puri. Though it is stated that the chart of adults, "is mainly intended for the use of persons working in the field," it is more than doubtful whether either table, without becoming rapidly tattered and torn, could really be so employed. Again, while not without their uses, short cuts to identification of this kind should not be regarded as final, but must needs be used with caution; that this is so is evident from the fact that in certain cases in both tables, owing to the system employed, the same characters are necessarily shown as common to more than one species or variety.

E. E. A.

KING (W. V.) & DEL ROSARIO (F.). **The Breeding Habits of *Anopheles litoralis* and *A. indefinitus* in Salt-Water Ponds.**—*Philippine Jl. Sci.* 1935. July. Vol. 57. No. 3. pp. 329–349. With 7 plates & 2 figs.

In the Philippines, the two species mentioned in the title are those that breed in salt water, and the observations and conclusions recorded in this paper are based on collections of larvae made during twelve months in salt and brackish ponds near Manila. The range of salt concentrations affording optimum breeding conditions for *A. litoralis* differs from that preferred by *A. indefinitus*; and salt concentrations, and consequently "the abundance of the two species," are subject to seasonal influences.

A. litoralis "is predominant during the dry season, when the salt concentration is high, and is strictly a salt-water breeder, doing best in water containing upwards of about 3 per cent." Though capable, *faute de mieux*, of breeding "in brackish or even fresh water," it is believed that "the species would ultimately become eliminated at low salt concentrations." On two occasions "fairly large numbers of normally active larvae and pupae" were found in water containing 8.8 per cent. of NaCl; this was the highest salt concentration in which breeding of *A. litoralis* was met with. In the higher concentrations larvae displayed "a curious thickening or encrustation of the epidermis."

"During the rainy season *A. indefinitus* becomes the predominant species, and the breeding of this mosquito is very largely limited to brackish and fresh water." In the dry season, when the ponds were slowly evaporating, the highest salt reading for water in which larvae of this species were collected was 3.8; this was exceptional, and the degree of tolerance usually exhibited by *A. indefinitus* is considerably lower.

Floating mats of algae of several species occurred in varying salt concentrations up to 9 per cent., and were characteristic of most of the ponds in which the larvae were found. E. E. A.

BAISAS (F. E.). Notes on Philippine Mosquitoes, V. The Pupal Characters of Anophelines under the Myzorrhynchus Series and Group Neocellia, with Further Comments on the Larvae and Adults of *sinensis*.—*Monthly Bull. Bureau of Health*. Manila. 1935. Sept. Vol. 15. No. 9. pp. 291–339. With 23 plates & 4 figs. [36 refs.]

TREILLARD (M.). Tableau synoptique pour la détermination rapide des anophèles d'Asie (régions orientale et extrême-orientale). I. Adultes.—*Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 279–282. With 1 fig.

TREILLARD (M.). Tableau synoptique pour la détermination rapide des anophèles d'Afrique (région paléarctique méditerranéenne et région aethiopienne). I. Adultes.—*Bull. Soc. Path. Exot.* 1936. Feb. 12. Vol. 29. No. 2. pp. 148–150.

MANSELL (R. A.). Cannibalism amongst Mosquito Larvae.—*Jl. Roy. Army Med. Corps.* 1936. Jan. Vol. 66. No. 1. pp. 50–51.

PIRUMOW. Die Dynamik der Malaria in S.S.R.A. [**Dynamics of Malaria in S.S.R.A.**].—*Arb. d. Tropeninstituts d. Volksge sundht. Kommissariat d. SSR. Armenien.* 1935. Vol. 2. [In Russian pp. 328–331. German summary pp. 360–363.]

Deals with the eradication of malaria in Armenia.

Following the antimalarial measures it was noted that :—the percentage of positive findings of the malaria parasite which was 48·5 per cent. in 1926 fell to 15 per cent. in 1930 and 28 per cent. in 1932.

Plasmodium vivax which was only 48·3 per cent. of all the positive findings has gradually displaced all the other varieties of malaria parasite, and rose to 81·4 per cent. in 1931 and 77·0 in 1932. *Plasmodium malariae* fell from 29·6 in the period 1924–1926 to 21 per cent. in 1931. *Plasmodium falciparum* fell from 19·2 in 1926 to 11·7 per cent. in 1932. Mixed infections showed a definite decline from 3·3 in 1926 to 1·4 per cent. in 1932.

The disappearance of malaria was not uniform in the different districts ; this was due to physical conditions, large swamps in some districts, not in others.

The eradication of malaria during the second five year plan was accomplished by an energetic and rapid reconstruction of all anti-malarial measures ; drainage, inclusion of agricultural and other organizations in the affected areas in carrying out the measures, the general use of the dispensary system in town and village, the inclusion of the entire medical officials in this work, the establishment of anti-malarial institutions in all the malarial areas which did not possess them, and educational propaganda. E. D. W. Greig.

CAUCHI (J.), BUNKALL (J. D.) & SELLERS (W.). **Mosquito Breeding in Septic Tanks.**—*West African Med. Jl.* 1935. Jan. Vol. 8. No. 3. pp. 8–9.

Culicine mosquitoes were found to be breeding in various types of septic tanks in Lagos during the month of June. The authors draw

attention to the importance of sealing the covers of such tanks, screening the fresh-air inlets, and setting up the effluent pipe in such a way that its end is under water. They found that the flushing cisterns of water-closets were dangerous as breeding-places of the yellow fever mosquito, especially when houses were empty, and the cisterns undisturbed. W. F.

MARTZ (F.). Les fosses septiques et les moustiques. [**Septic Tanks and Mosquitoes.**]*—Mouvement Sanitaire.* 1936. July. Vol. 13. No. 147. pp. 334–335.

The septic tank has many advantages but that it allows of development of mosquitoes is a serious disadvantage. This may occur in the anaerobic section and in the filter. Addition of oil would remedy the mosquito trouble but might interfere with the proper functioning of the tank. Discharge of the oil by the pipe on to the filter would seriously impede the action of the latter, oxidation would be prevented and the effluent would pass off unpurified. To prevent mosquito-breeding the author recommends that :—

1. The pipe discharging the fermented matter should be of large diameter and situated fairly deeply so that the upper, oily layers are not discharged.

2. The aeration tubes and those of the filter should be provided with a fine-mesh net of unoxydizable metal.

3. The joints of the plugs should be sealed with fine sand.

4. The fermentation tank should be cleaned out from time to time and the filter once a year. H. H. S.

MAY (Raoul Michel). L'hexachloréthane dans la lutte contre les larves de moustiques. [**Hexachlorethane as a Larvicide.**]*—C. R. Acad. Sci.* 1936. Jan. 20. Vol. 202. No. 3. pp. 246–247.

Hexachlorethane is a solid which evaporates at ordinary temperatures ; the resulting gas kills larvae and even pupae. A mixture of two-thirds hexachlorethane and one-third of talc is recommended for dusting on water. It is specially recommended for watertubs, ponds containing water for watering gardens and the like. It is harmless to man and animals. A special advantage is that the gas penetrates to the surface of water covered by weeds and algae. W. F.

MAY (R.). L'hexachloréthane dans la lutte contre les moustiques. [**Hexachlorethane as a Larvicide.**]*—Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 336–342.

Non-poisonous and effective, but only tested in experiments on a small scale.

Hexachlorethane (C_2Cl_6) cannot be ground up readily into a fine powder. For use, the crystals are dissolved in trichlorethylene, and one part of talc is added for every two parts of C_2Cl_6 . The solvent is then allowed to evaporate and the dried powder is distributed over the surface in the same manner as Paris green. It quickly forms a gas which poisons all mosquito larvae and most of the pupae. The talc soon disappears and mosquitoes are not driven to seek new, and often

inaccessible, breeding places, as they are when oil is used. About 1 kilo is required for 100 square metres. It is not toxic for man, beasts, fishes or aquatic vegetation. W. F.

WANSON (M.). Note sur les trous de crabes, gîtes larvaires. [**Mosquito Breeding in Crab-Holes.**]—*Ann. Soc. Belge de Méd. Trop.* 1935. Dec. 31. Vol. 15. No. 4. pp. 575–585. With 2 figs.

Boiling water is the remedy.

Banana is a sandy peninsula below sea level at the mouth of the Congo. In the dry weather, 2,000 adult mosquitoes were caught in 330 crab-holes there. Most of them were *Aedes* and *Culex*, but 13·20 per cent. were *A. gambiae*. In the wet weather, when the holes were flooded, larvae were found breeding in them and 26·70 per cent. were *A. gambiae*. *Aedes aegypti* was not found. The mosquitoes bred neither in the crab-holes on the beach nor on the banks of the neighbouring creek, but only in the holes of the land crabs. No *Anopheles* were found breeding in water aspirated from the holes during the dry weather, though it serves as a shelter for the adults at this season. The author destroys them as follows:—Three men heat 1,600 litres of water in large metal containers, and, when it boils, they pour several litres down each hole. The crab pulls itself to pieces and dies at once. Three men can deal with more than 600 holes in a day. Diagrams of the crab-holes are given. W. F.

PETERSEN (Magnus C.). **Recurrence of Inoculation Malaria.**—*Jl. Amer. Med. Assoc.* 1936. Mar. 7. Vol. 106. No. 10. pp. 775–777.

Four strains of benign tertian malaria were employed in the inoculation of 261 patients. Usually the attacks stopped promptly when quinine was given, but parasites often remained in the circulation for a long time. In 14 cases parasites were found in thin smears from 6 up to 150 weeks after the fever had subsided. The average amount of quinine which had been given to these patients was 44 grams. In 6 cases a recurrence occurred after 30 weeks, or after a period which was a multiple of this. The temperature curve was more irregular in the recurrence than in the primary attack, and parasites were scarcer. It is suggested that in respect of relapses, there is little difference between blood-inoculated and mosquito-inoculated malaria.

JAMES states that the late recurrence at the seventh month does not occur after blood-inoculated malaria. W. F.

OSGOOD (Edwin E.). **Phagocytosis of Malaria Parasites by the Neutrophil Leukocytes of the Marrow.**—*Proc. Soc. Experim. Biol. & Med.* 1935. Nov. Vol. 33. No. 2. pp. 219–220.

Bone-marrow was obtained from the sternum in 5 cases of inoculated-tertian malaria, and, in every instance, malaria parasites were found within the neutrophile leucocytes in all stages of digestion from the intact organism to the residual collection of pigment, although there was no evidence of phagocytosis in ordinary blood films which were made at the same time, beyond the occasional presence of pigment granules within the cells. W. F.

CORRADETTI (Augusto). Sull'immunità acquisita nella terzana benigna in relazione col trattamento dell'attacco primario. [**Acquired Immunity in Benign Tertian Malaria : its Relation to Treatment of the Primary Attack.**].—*Riv. di Malariologia*. Sez. I. 1936. Vol. 15. No. 3. pp. 161-170. With 4 charts (3 on folding plate). English summary.

The observations described in this paper were undertaken with the object of confirming an opinion expressed in the third general report of the Malaria Commission of the Health Organisation of the League of Nations. This opinion was to the effect that, from a strictly scientific point of view, no specific treatment should be given during a primary attack of benign tertian fever : the patient would then have an opportunity of acquiring a sufficient degree of immunity to prevent relapse.

Fifteen patients suffering from general paralysis were infected with a Madagascar strain of *P. vivax*, by means of anophelines. Five of these were given quinine after the first attack of fever. Five others received quinine after the fifth attack of fever, and the remaining five after the tenth attack. The temperature was taken and the blood was examined of each patient, every day, throughout a period of twelve months. The results of these examinations are set out in graphic form. They indicate that treatment of the primary attack of fever after the first access of fever does result in more frequent relapses than when the administration of quinine is delayed, and that a longer time is required to develop immunity. On the other hand the total number of attacks of fever suffered by the patient is diminished by the prompt administration of the drug. The author concludes that, from the point of view of the patient, a reduction in the number of attacks of fever is of greater importance than an acceleration in the acquisition of immunity and that, therefore, a primary attack of benign tertian malaria should be treated as soon as possible.

N. W.

JAMES (S. P.). **Chemotherapy of Malaria.**—*Nature*. 1935. Nov. 9. Vol. 136. No. 3445. pp. 743-745.

Very little chemotherapy research is done in England owing to lack of money for this purpose.

"It has to be admitted that, despite some remarkable discoveries, existing knowledge on the prevention of malaria is not sufficient. Direct war on the malaria-carrying mosquito is too difficult and too costly for general use, and quinine has failed to maintain its old reputation as the sovereign remedy which meets all needs." In support of this conclusion, Colonel James instances the recent epidemic in Ceylon and the ineffectual attempts to combat it, the failure of antimalaria measures in Mauritius, which have cost the government more than 3½ million rupees since 1909, the even more expensive and less successful antimalaria work in Lagos and the immobilization of the English, French and German armies by malaria in the Struma valley during the war. "More knowledge is needed in many different directions, one of them being chemotherapy, in which subject British chemistry has as yet played only a very small part. This seems surprising when we reflect that, of the 3½ million deaths from malaria recorded in the world every year, the great majority occur in the British Empire, and that the British Empire alone spends every year about £450,000 on quinine. . . . It is not expected, of course, that in England funds available for chemotherapy research will ever be provided on the same scale as in Germany,

but . . . having regard to the humanitarian, economic and imperial interests at stake, it is greatly to be hoped that something will be done about it."

W. F.

MEGAW (John). **A Simple Method of checking the Strength of Stock Mixtures of Quinine.** [Lab. Demonstration.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. June 30. Vol. 30. No. 1. pp. 4-5.

"The requirements are:—

"(1) Quinine test reagent consisting of pure phosphotungstic acid 1 oz., dilute sulphuric acid (B.P.) 5 oz., rectified spirit 12 oz.

"(2) Control solution of quinine of the same strength and composition as the mixture to be tested, *e.g.*, 10 grains to the ounce.

"(3) A few test tubes of equal calibre—about $\frac{1}{8}$ inch by 3 inches.

"(4) A marked pipette to deliver about 2 cc.

"(5) A small pipette marked so as to measure 0.2 c.c.

Method.

"Put 2 c.c. of the test reagent in each of two test tubes. Add 0.2 c.c. of the control solution to one tube and mix well immediately by reversing the tube five or six times while keeping it closed. Add 0.2 c.c. of the mixture under test to the other tube, mix well immediately. Then mix the contents of both tubes simultaneously and place the tubes in a vertical position.

"If the two solutions have been treated in exactly the same way any difference in their strength will be indicated within 10 minutes by differences in the height of the supernatant liquid, and in half an hour by differences in the height of the precipitates.

"If the stock mixture is stated to be 5 grains to the ounce, the control solution must, of course, be the same and 0.4 c.c. of each of the quinine solutions must be added to the tubes containing the test reagent.

"... Do a few preliminary tests, first using two solutions of the same strength, and then solutions of different, but known, strengths until the technique is mastered. Note that if the quinine solution is not *immediately* mixed, after being added to the reagent, variations in the precipitate will result.

"The purity of the stock quinine powder can be tested by comparing a solution made up on the spot with a control solution made from pure quinine."

The method is not suitable for accurate quantitative estimates of the strength of mixtures.

N. W.

STATISTICAL BULLETIN METROPOLITAN LIFE INSURANCE COMPANY. 1935. Oct. Vol. 16. No. 10. pp. 7-9.—**The Rising Menace of Malaria.**

"It is an indisputable fact that any community can now rid itself of every trace of this disease if it so desires. All that is necessary is the application of the principles laid down by General GORGAS in his work in Cuba and the Panama Canal Zone more than 30 years ago. . . . About 97 per cent. of all malaria cases in the United States occur in the south-eastern section of the country. In each of the 13 States included in this area, there has been an alarming increase in malaria mortality since 1931. These increases have ranged from 24 per cent. in Missouri and Arkansas to 140 and 169 per cent. in Louisiana and Mississippi, respectively. . . . In 1934, there were 4,520 deaths in the entire United States ascribed to malaria . . . a malaria prevalence of at least 900,000 cases in the United States at the present time."

[The Canal Zone is hardly "rid of every trace of the disease."] W. F.

CHOLERA.

VAN HUNSEL (J. H. F. E.). De uitroeiing van de cholera en de strijd tegen de pokken in Nederlandsch-Indië, met eenige epidemiologische beschouwingen betreffende in Nederland voorgekomen pokken-epidemieën. [**The Eradication of Cholera and the Campaign against Smallpox in Netherlands India.**]—*Geneesk. Bladen uit Klin. en Lab. voor de Praktijk*. 1936. 33rd Ser. No. 12. pp. 373-410 (1-38). With 2 maps. [43 refs.] [Summary appears also in *Bulletin of Hygiene*.]

In this monograph many interesting points of history and practice are considered. Of the three main tables contained in the work the first is the most interesting. In it the two diseases cholera and smallpox, with their mortality and morbidity, are set out for British India and, collectively, for Java and Madoera from 1912 to 1935. The population of British India in 1921 was 318,942,000 and of Java and Madoera 34,984,171 in 1920. We find from the table by summation that the number of deaths from cholera in British India was, during the years 1923-1934, 2,490,409, and for Java and Madoera only 17, of which 16 were in the year 1927 and one in 1928. It seems evident that the great improvement in the Netherlands Indies, as regards cholera, must be set down to the introduction of pipe water supplies, reorganization of the public health service, large scale vaccination, insistence on certificates of vaccination for immigrants and pilgrims, and strict quarantine regulations. The map given for the distribution of cholera cases in Eastern ports of 1934 is rather significant in its showing of infection in all important ports of British India, Siam, French Indo-China, China and the Philippines with complete freedom of those of Netherlands India, Australia and New Zealand. It is obvious too that consideration will have to be paid to the question how far air services may modify the present state of affairs.

In the case of smallpox a glance at the table and the map of distribution in 1934 show that this disease, although reduced to negligible proportions, has not been completely eradicated from the Netherlands Indies. Only one case seems to have occurred in Sumatra in 1934 and one in Java, a marked contrast to the 1,529 recorded for Calcutta. A most interesting reference is made to what is now past history—the development of the production of a thoroughly reliable vaccine lymph. This is especially associated with the name of NIJLAND, who maintained that any great multiplication of institutes for this purpose was quite unnecessary. Thus, whereas in Holland with a population of 5.9 million there were 12 such institutes, there was only one central institute for Java and Madoera, with a population of 30 million. The chief reason for the difference is to be found in the large yields from vaccinifers and the preservation of the lymph obtained, points to which NIJLAND paid especial attention. An indication of this yield may be obtained from OTTEN's figures of what was required for the whole of the Netherlands Indies with a population of 60 million. These are given as 4-6 rabbits, 8-12 cow calves and about 60 buffaloes. A comparatively recent development too is the preparation of a dried vaccine lymph which has high keeping qualities even in a hot tropical climate.

W. F. Harvey.

BERNARD (P. Noël). *Le choléra en Indochine et en Extrême-Orient.* [**Cholera in Indo-China and the Far East.**]—*Arch. Insts. Pasteur d'Indochine*. 1935. Apr. Vol. 6. No. 21. pp. 3-75. With 6 graphs & 2 maps. [114 refs.]

This is a comprehensive review of the position as regards cholera in the East. It extends in its range from British India to Japan and the Philippines and contains many interesting observations.

Cholera may be endemic, and is endemic, in India, Indo-China and China, but "India is the only part of the world where cholera has existed in a permanent fashion from the remotest times and in the same form." The emphasis here is evidently not on the endemicity but on the permanence of the presence of cholera as compared with its periodic disappearance in other countries.

In marked contrast to India, or more definitely Bengal, we have the three great archipelagoes of Japan, the Philippines and the Netherlands Indies. They are all subject to the menace of cholera and yet Japan and the Netherlands Indies have remained immune, or practically immune, from the disease. In the Philippines epidemics are more frequent and more lasting but there has been notable diminution during the past 12 years. French Indo-China is especially vulnerable to all methods of penetration of cholera—by land and by sea. The conditions too are very favourable for the extension of the disease. Thus it is not surprising that cholera has also been known in Indo-China from the remotest antiquity. The endemicity of cholera in Indo-China is referred to Cochin-China, Cambodia and Southern Annam: it does not concern Tonking, Northern Annam and Laos. Endemic cholera is liable, in these areas, to be confused with alimentary disturbance and especially the intoxications due to the *enterococcus*.

What is interesting in the Far East is the success of preventive measures against cholera in the Netherlands Indies and Japan. Take the statistics of Japan. In 1902 and 1916 there were 13,362 and 10,371 cases of cholera; in 1917, 1918 and 1919 there were 894, 0 and 2,912 cases, and in 1932, 1933 and 1934 there were 0, 5 and 0 cases. The successful exclusion of cholera in Japan, which is menaced by China and especially by Shanghai, affords the proof that "the same means of defence have given to Japan the same results as to the frontiers of Europe." W. F. H.

HERNANDO (Eugenio). *Epidemiological Analysis of the Epidemic of Cholera in the Visayan Region during the Period from 1930 to 1934.*—*Monthly Bull. Bureau of Health*. Manila. 1935. Dec. Vol. 15. No. 12. pp. 429-459, & 1936. Jan. Vol. 16. No. 1. pp. 3-20. With 3 maps & 2 graphs.

LOH (V. T.) & TAI (T. Y.). **A Study of the Blood in Cholera with a Note on Urine Analysis.**—*Chinese Med. J.* 1936. May. Vol. 50. No. 5. pp. 651-664. [16 refs.]

It is suggested in this study that the administration of large amounts of sodium chloride by intravenous injection may be harmful in cholera patients and increase the gravity of the acidosis and uraemia of the later stages of the disease. "If a patient received within two days, say fifteen litres of normal saline, it would mean that he receives 135 grams of sodium chloride, which is an enormous amount even for a patient who had lost part of it through vomiting and diarrhoea." A solution

with lower percentage of sodium chloride is recommended, of composition, sod. chloride 0.6 or 0.7 per cent., pot. chloride 0.03 per cent., calc. chloride 0.025 per cent. and glucose 2.5 per cent. The glucose acts as a diuretic. When desirable 0.5 per cent. sod. bicarbonate may be added to counteract the tendency to acidosis. If the substitution of this salt-alkali-glucose solution for the ordinary normal salt or hypertonic solution in the treatment of the dehydration of cholera is proved more beneficial, it is likely to be so in other conditions in which dehydration is a prominently grave condition. W. F. H.

MUSTAPHA (Ali). Action sur le lait et pouvoir cholérigène du vibron cholérique. [**Action upon Milk and Cholera-producing Power of the Cholera Vibrio.**].—*C. R. Acad. Sci.* 1936. June 29. Vol. 202. No. 26. pp. 2188-2190.

KOCH originally laid stress upon the fact that the cholera vibrio grew well in milk and acidified it without coagulating it. This characteristic of the cholera vibrio has been somewhat neglected, and the author has investigated it anew with 64 strains of cholera vibrios—10 from India and 15 from Indo-China, which had been isolated in large epidemics, 12 from epidemics in Baghdad and Basrah of limited extent and little power of diffusion, and 27 of El Tor type. The result was that all but one of the strains from India and Indo-China grew well in milk but did not coagulate it, while the vibrios of Baghdad and Basrah, derived from feeble epidemics, did coagulate it. The ability to coagulate milk attained its maximum in the El Tor vibrios which, although apparently true cholera vibrios, do not produce cholera. Thus there may be considerable importance attachable to this criterion, which seems to distinguish between the epidemic and non-epidemic types of cholera vibrio. The more active the strain in coagulating milk the less is its cholorigenic power. W. F. H.

WHITE (P. Bruce). **Observations on the Polysaccharide Complex and Variants of *Vibrio cholerae*.**—*Brit. Jl. Experim. Path.* 1936. June. Vol. 17. No. 3. pp. 229-234.

Detailed evidence is offered by the author in this communication of the views expressed in previous publications (this *Bulletin*, 1934, Vol. 31, p. 895; 1936, Vol. 33, p. 374) regarding the polysaccharide structure of vibrios, which is the basis of their specificity. The S, R and ρ forms of a vibrio represent respectively degrees of degradation of the normal S form by loss of dominant polysaccharide constituents and consequent unmasking of one or other of the remaining polysaccharide elements, which becomes dominant in its turn. Four distinct groups of polysaccharide receptors, named $C\alpha$, $C\beta$, $C\gamma$ and $C\delta$, account for the serological specificity of the normal parent S form and its variants. The S form possesses $C\alpha$, $C\beta$, $C\gamma$ and $C\delta$ receptors with $C\alpha$ dominant, the R form $C\beta$, $C\gamma$ and $C\delta$ with $C\beta$ dominant and the ρ form $C\gamma$ and $C\delta$ with $C\delta$ dominant. This is the thesis presented. No variant degraded below the ρ form has yet been discovered and the polysaccharide substances contained by this form are "common in whole or in part to many vibrios." Although the polysaccharide elements of the vibrio have been thus far differentiated, it must not be assumed that they are unit substances. They may be internally complex and "the characteristic smooth receptors of the Inaba and Ogawa types of *V. cholerae*— $C\alpha$ (Inaba) and $C\alpha$ (Ogawa)—are almost certainly so." A

point of great importance in the recognition of these differential characters in organisms is the preparation and possession of the specifically reacting monovalent polysaccharide-precipitating sera. Thus anti-C α sera are best prepared by intravenous injection of S vibrios, living or killed at 56°C. over a short period, and anti-C β sera by injection of R vibrios under the same conditions, while anti-C δ sera have been usually obtained by inoculation of rabbits with living ρ vibrios. "No direct and certain method has been found of obtaining a monovalent anti-C γ serum. A monovalent anti-C γ serum can, however, be obtained, as is the case with the other monovalent specific sera, by saturation methods. In this way C γ serum can be obtained from a mixed C γ -C δ serum by saturation with C δ polysaccharide.

The separation of the C α , C β , C γ and C δ factors is a matter largely of chemical fractionation methods and the use of the differential action of papain. Thus the digestion of cholera vibrios with papain in faintly acid medium will result in solution of the C α and C γ constituents only: the undissolved C β and C δ can then be obtained from the residue with alkali.

It is not contended that the ultimate fractions of the vibrios are entirely pure substances. They may be "contaminated with inactive material." Not only so, but the extension of the term "polysaccharide" to the four substances named may possibly be a misnomer. There are two main fractions, I and II, obtained in the course of the chemical manipulations and these are—in the case of the cholera vibrio—each derived from S, R and ρ forms. The results of precipitation reactions of monovalent anti-S (C α), anti-R (C ρ), anti- ρ (C γ) and anti- ρ (C δ) sera upon fractions I and II, with their several special treated portions, form the basis of the argumentation developed in this article.

The application of these methods to the various agglutination types of vibrio has now been begun. "It will suffice to say here that the true El Tor vibrio presents a polysaccharide complex serologically identical with that of *V. cholerae* (of the same absorption type); that the C γ and C δ factors seem to be common, so far as can be judged by simple precipitation tests, to all the types of vibrio so far examined; that different groups of vibrios show sharp differences in the behaviour of their C β substances; and that the C α substances determine the serological specificity of the various smooth types."

W. F. H.

- i. HEIBERG (Børge). **The Biochemical Reactions of Vibrios.**—*Jl. Hygiene*. 1936. Feb. Vol. 36. No. 1. pp. 114–117.
- ii. ——. **Two Serologically Different Groups among the True Cholera Vibrios.**—*Ibid.* pp. 118–124.

i. In the main the first of these two articles is controversial and makes reference to GARDNER and VENKATRAMAN's expression of qualified doubt as to "the possibility of an accurate biochemical classification" of the vibrio group. According to Heiberg it is "possible to distinguish six different types of fermentation in vibrios" by the use of only three sugars, mannose, saccharose and arabinose. The most important of his groups, the type I, with fermentation manifested in mannose and saccharose but not in arabinose, contained 287 out of 384 test strains of vibrios collected at random. With the exception of the vibrio "Dunbar" all the strains in this group agglutinated with an anti-cholera serum. All the strains, however, showing a variation in fermentation from this type I, that is to say the types II to VI, except

vibrio "Dunbar," differed from the true cholera vibrios not only serologically but also biochemically. The conclusion therefore to be drawn is that "any vibrio, not fermenting according to type I, has no (or hardly any) O-antigen common to the true classical cholera vibrios (Gardner and Venkatraman O-group I).

ii. The second article treats of a subdivision of true cholera vibrios into "a large group with the common factor A alone and a smaller group with one factor more (B) in addition to the common factor A." This separation of groups has been effected by using cross-absorption tests as well as cross-agglutination. Both the antigens A and B are thermostable somatic antigens. "This finding may be of importance in epidemiological investigations and in the preparation of vaccines."

W. F. H.

KOROBKOVA (E.). Observations ultérieures sur la cytologie des vibrions cholériques. [**Cytology of the Cholera Vibrio.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1936. Vol. 15. No. 1. [In Russian pp. 13–20. With 3 figs. French summary pp. 20–22.]

The demonstration of the presence of a nucleus in bacteria has occupied the attention of many workers. Recent researches into variation and microbial dissociation have renewed the interest in this matter. According to the author distinct nuclei can be shown in bacteria but only at a certain stage of development and this stage is very fleeting. Great variation can be observed in cholera vibrios grown in starch media and one of the variations is the production of nucleated forms and also of giant nucleated forms. A good medium to use is one of horse bouillon with 0.5 per cent. Witte peptone, 0.5 per cent. salt, 18 per cent. starch and pH 7.6. Cholera vibrios of 5–6 days are sown in this medium, incubated at 38–39°C. for 48 hours and maintained at 10–12°C. for 48 hours. Such a culture provides beautiful nucleated forms from the 5th day. "These nucleated elements are attached to certain colonies of type O which under the action of lytic principle dissociate into S forms." The O stage is only temporary and may be missed. By suitable conditions of cultivation the O phase may be prolonged and nucleated forms obtained with greater regularity.

W. F. H.

AIDA (T.). Ueber die im Sommer 1934 in Shanghai als Cholerabazillus isolierte Vibrio.—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1936. Apr. Vol. 35. No. 4 (373). [In Japanese pp. 766–776. [45 refs.] German summary p. 777.]

SUGIO (K.) & SHIMOMURA (H.). The Studies on Agglutination and Agglutinin Absorption Test of *B. cholera*.—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa)*. 1936. Feb. Vol. 35. No. 2 (371). [In Japanese pp. 518–533. English summary p. 534.]

Three results emerge from this study of the value of agglutination and absorption tests for the identification of the cholera vibrio. They are that :—(1) Cholera vibrios when killed, whether by heat or formalin, show great variability in specific agglutination reactions, whereas these remain definite and constant when living vibrios are used. (2) Vibrios grown on nutrient media of lower pH are more agglutinable and have higher absorptive power than when grown on a more alkaline medium,

although the latter is more favourable to growth itself. (3) The higher the pH of the menstruum in which the vibrios are suspended for agglutination tests, the more rapidly is the reaction completed.

These points should all be taken into consideration in applying tests.

W. F. H.

SCHOLTENS (R. Th.). Analyse des récepteurs du vibron cholérique.

[**Receptors of the Cholera Vibrio.**]—*Ann. Inst. Pasteur.* 1936. June. Vol. 56. No. 6. pp. 710-716.

In a previous work (this *Bulletin*, 1936, Vol. 33, p. 376) it was shown that the cholera vibrio possessed two thermostable antigenic receptors A' and B' capable of giving rise to agglutinins A and B. Most strains possess only the receptor A' but a few possess both A' and B'. It was interesting then to determine whether sera possessing only agglutinin A and those possessing both A and B reacted in a differential manner when amboceptors were concerned, as in the deviation of complement test and also how these sera behaved in absorption tests. Experiments were carried out to this end and the conclusions come to were:—(1) The antigen B' and its antibody B do play a part in the reaction of deviation of complement and this action may be even more important than that of A' and A. (2) Strains possessing both A' and B' do not absorb the agglutinin A so well as the strains which have only the receptor A'. (3) It seems advisable to incorporate both antigens A' and B' in anticholera vaccines.

W. F. H.

VASSILIADIS (P. Ch.). Action du chloroforme sur les agglutinations flagellaire "H" et somatique "O" des vibrions, et mutations sérologiques de ces antigènes. [**Action of Chloroform on Flagellar H and Somatic O Agglutination of Vibrios and Serological Mutations of these Antigens.**]—*Jl. Egyptian Med. Assoc.* 1936. May. Vol. 19. No. 5. pp. 247-283. [21 refs.]

Chloroform is a solvent of fats and it would seem that it dissolves a lipid necessary for O agglutination. Its action in the case of H agglutination may be the removal of a lipid inhibiting this type of agglutination. Some of the results obtained by the author were:—(1) Chloroform extraction considerably reduces the O agglutinability of vibrios by specific serum. (2) The thermostable antigen O, which is rendered almost inagglutinable by chloroform, is not destroyed, for it is still capable of acting as antigen in animal injection and also in absorption of O agglutinin. (3) Chloroform extraction considerably increases the H agglutinability of vibrios and may even cause an H agglutination in non-agglutinable vibrios. (4) Mutations of agglutinability were observed in three vibrios El-Tor of 1935. (5) Two vibrios, non-agglutinable at the time of their isolation at El-Tor in 1935, became agglutinable later.

W. F. H.

VASSILIADIS (P. Ch.). Modifications de l'agglutination somatique O et flagellaire H des vibrions après traitement par le chloroforme. [**Modification of Somatic O and Flagellar H Agglutination of Vibrios by Chloroform.**]—*C. R. Soc. Biol.* 1936. Vol. 121. No. 11. pp. 1069-1071.

Extraction of vibrios by chloroform (1) lowers considerably their somatic O agglutinability: (2) increases very markedly the H flagellar

agglutinability of cholera vibrios ; (3) causes to appear a flagellar H agglutinability of considerable titre in vibrios which are not agglutinable as such by HO anticholera serum.
W. F. H.

YANG (Y. N.), TSAO (S. L.), CHANG (Y.) & CHUNG (C. Y.). The Bactericidal Action and Agglutinin Response of Persons Inoculated with Typhoid and Cholera Vaccines.—*Chinese Med. Jl.* 1936. Feb. Supp. No. 1. pp. 202-212.

GHOSH (H). Further Investigation of a New Anti-Cholera Serum.—*Brit. Med. Jl.* 1936. May 9. pp. 936-938.

In this modification of the author's original method a much larger quantity of seed culture is used for inoculation of the special broth than in the case of manufacture of the original toxin (this *Bulletin*, 1933, Vol. 30, p. 538). The toxin obtained is used to immunize serum horses. In the trials now made only whole immune serum was given, in one intraperitoneal dose of 70 to 80 cc. diluted with 200 cc. warm salt solution, instead of concentrated serum as on the previous occasion (this *Bulletin*, 1935, Vol. 32, p. 459). Altogether 47 cases were treated with a mortality of 10.63 per cent. as against 170 control cases treated by other methods with a mortality of 20.5 per cent. Uraemia, it is noted, was absent in the serum treated cases and this is regarded as "an indication of the neutralizing effect of the serum on the toxin, which could not therefore cause any further damage to the kidney." Tympanitis too was rarely observed. Only two patients out of the 47 showed a mild urticaria.
W. F. H.

PASRICHA (C. L.), DE MONTE (A. J. H.) & GUPTA (S. K.). A New Type of *Cholera* phage—Type M.—*Indian Med. Gaz.* 1936. Apr. Vol. 71. No. 4. pp. 194-196. With 1 fig.

The addition of a twelfth type of cholera phage to those already existing is made by the authors an occasion for very interesting remarks on the cholera phage question. A new cholera phage, type M, has been isolated, which is slow acting, gives an incomplete lysis in liquid medium, acts on both rough and smooth vibrios and has a very wide range of activity. All types of cholera phage possess one common characteristic in that they have "reciprocal" action ; "the secondary culture obtained after the action of any one type is lysable by the remaining types of cholera phages." All of these phages act on "ultrapure" cholera vibrios, but vary in the effects they produce singly or combined. Perhaps the most interesting of these phages is the type A, which acts only on agglutinable vibrios possessing a considerable amount of smooth element. Again "type A antiphage serum inhibits only type A cholera phage, whereas the other types appear to be related serologically." All the other cholera phage types, B to M, lyse a certain number of inagglutinable vibrios. Transformation of vibrios from one strain to another, or even one species to another, is a subject of constant controversy. This subject is closely related to the phage question, for alteration of the antigenic structure of an organism, as of smooth to rough or the reverse and of agglutinable to inagglutinable, can be brought about by phage action. Pasricha and his co-workers have dealt also with vibriophages in general as distinct from purely cholera phages. This distinction is made by defining vibriophages as those "which are active on inagglutinable vibrios and which if active on inagglutinable

vibrios do not give the reciprocal cross test." Under the influence of certain vibriophages some strains of inagglutinable vibrios become agglutinable and indistinguishable from true cholera vibrios. Thus it is certain that in the present-day studies of vibrios special attention must be paid to the rôle of the cholera phage and the bacteriophage in effecting what seems to be a transmutation. W. F. H.

PASRICHA (C. L.), DE MONTE (A. J. H.) & O'FLYNN (E. G.). **Bacteriophage in the Treatment of Cholera.**—*Indian Med. Gaz.* 1936. Feb. Vol. 71. No. 2. pp. 61–68. With 1 graph. [16 refs.]

A serious and very commendable attempt has been made, by the authors of the trials here described, to assess the therapeutic value of bacteriophage in cholera on an alternate case basis. The criterion of the fatal issue, which has the advantage of being definite and incontrovertible, is the one employed. An immediate difference is apparent between the old mortality statistics of 8·1 per cent. for the phage-treated cases and 62·9 per cent. for the untreated and the present series. In this present series 1,369 cases of cholera were admitted to hospital. "Of these, 684 cases were treated with specially prepared cholera phage and 685 were not treated with cholera phage." This division into two groups was made by admitting patients alternately into two separate wards. The mortality figures now became 13·5 per cent. for the phage-treated and 16·6 per cent. for the non-treated. It is admitted that the results have not been dramatic and that the authors "have not met with the striking results obtained by some of the previous workers." No analysis has been attempted of the age distribution or severity distribution in the two groups of trial cases on admission to hospital but some analysis has been made of the severity of the disease as it evolved. This latter analysis has tended to accentuate the value of treatment by phage in modifying the course of cholera favourably. Other analyses are of the presence of agglutinable vibrios or inagglutinable vibrios in the stools and the absence of vibrios. The mortality figures show up much more favourably, as between treated and untreated, when agglutinable vibrios only were found. One difficulty, or rather supposition, is mentioned as militating against the strictly alternate character of the groups involved and that is the possibility of spread of bacteriophage from the ward of untreated cases to the ward of treated cases. This, it has always been maintained by D'HERELLE, vitiates all such trials. An interesting fact is also brought out which, not being easily explainable, is meanwhile left out of account. This was that the relative mortality rates as between phage-treated and non-treated are reversed altogether when only inagglutinable or no vibrios were isolated, for now it is the non phage-treated patients who show more favourable results. Nevertheless there was no reason to suppose that cases in which no vibrios could be found were not cholera cases.

All circumstances having been taken into account, the authors reach a well argued conclusion from a scientifically planned trial when they say:—"Comparison of the results of the experiment, taking recovery or death as the sole criterion of the value of cholera phage, shows that bacteriophage has caused a real reduction in cholera mortality in cases passing vibrios and that this reduction is more marked in those cases passing agglutinable vibrios." W. F. H.

RAYNAL (J.). Rapport de mission aux Indes Anglaises relative à l'étude des bactériophages appliqués à la prévention du choléra (Août-Septembre 1933). [**Report on the Mission to British India for the Study of Bacteriophage Prophylaxis against Cholera.**]—*Arch. Insts. Pasteur d'Indochine*. 1935. Apr. Vol. 6. No. 21. pp. 77-126. With 1 map & 15 figs. [Refs. in footnotes.]

The mission referred to here had as its object "the study at the bacteriological laboratory of Shillong . . . of the technique of preparation of bacteriophages and their application to the prevention of cholera." The report is very full on the subject of technique and non-committal on the subject of claims for success of bacteriophage prophylaxis or therapy (see this *Bulletin*, 1935, Vol. 32, p. 460). *W. F. H.*

DZEN (M. Y.) & YU (H.). **The Optimum Dosage of Prophylactic Cholera Vaccine.**—*Chinese Med. Jl.* 1936. Feb. Supp. No. 1. pp. 198-201.

Arrangements for mass prophylactic inoculation with any vaccine may demand a special procedure. In the case of the municipalities of Shanghai and other centres in China it has not as a rule been possible to administer more than a single dose. This and the fact that the immunity induced is short lived constitute the difficulties of the situation. At the same time the dangerous season for cholera epidemics in China is a short one and "confined to a few weeks during the summer season." Thus it becomes important to determine the single optimum dose of vaccine which will be most effective under these circumstances. The authors realized that actual protection tests were even better than agglutination response for this purpose and used very considerable numbers of guineapigs in their experiments. These experiments involved injection of the prophylactic subcutaneously and a testing dose two weeks later of 5 cc. of a 16-hour broth culture of *V. cholerae*. They obtained, for concentrations of sterilized vaccine of 2,000, 4,000 and 8,000 million per cc. and the use of 124, 42 and 122 guineapigs respectively, percentage mortalities of 41.94, 22.50 and 20.49. The control group of unvaccinated guineapigs, 75 in number, gave a mortality of 68.66 per cent. It was therefore evident that "the more highly concentrated vaccine is undoubtedly the most effective." A further experiment with a system of vaccination by two injections of 1 cc., each containing 2,000 million organisms, gave only one death out of 42 guineapigs. The conclusions drawn are that (1) where possible two injections are better than one, and (2) if only one is possible the concentration should be raised from 2,000 million to 4,000 or 8,000 per cc. *W. F. H.*

TEWARI (M.). **A Secondary Reaction after Anti-Cholera Inoculation.**

[Correspondence.]—*Lancet*. 1936. Mar. 7. p. 572.

— **Late Reactions after Anti-Cholera Inoculation.** [Correspondence.]—*Indian Med. Gaz.* 1936. Apr. Vol 71. No. 4. p. 242.

This is a record and a request for an explanation of the occurrence of a secondary reaction to inoculation of cholera vaccine. It occurred in about 8 to 10 per cent. of persons inoculated, on the 12th to 14th day and took the form of localized redness, pain and tenderness with rise of temperature. As a reaction it was milder than the primary.

W. F. H.

PLAGUE.

QUARTERLY BULLETIN OF THE HEALTH ORGANISATION. LEAGUE OF NATIONS. Geneva. 1936. Mar. Vol. 5. No. 1. pp. 89-109. — **Plague.** [Report of Committee on Plague and Resolutions of Pan-African Health Conference, Johannesburg, Nov. 20-30, 1935, pp. 89-95.] THORNTON (Edward N.). **Position in Regard to Plague in the Union of South Africa** [Annex I. pp. 96-102.]. GIRARD (G.). **The Plague in Madagascar, and the New Knowledge gained from Research during the Last Three Years** [Annex II. pp. 103-107.]. RIBEIRO (L.). **Developments in Endemic Plague in Angola from 1932 Onwards** [Annex III. pp. 108-109.].

I. Points of interest and importance taken from this report are :—
 (1) " In the Union of South Africa and countries grouped immediately to the north and west of it, the incidence of human plague is determined by the epizootic among wild rodents, infection being in great part direct from wild rodents, and to a less extent from domestic rats infected by fleas from wild rodents." (2) In the more northern territories there is evidence of an increasing importance of the domestic rat. (3) Epizootics may have been in progress for some time before they are discovered. It is manifest that close observation of the habits of wild rodents and of the clues which afford evidence that an unusual death rate is occurring, is necessary if early discovery of the epizootic is to be made. (4) Resolutions were adopted :—

(a) " That the best practical policy for towns is to concentrate on the systematic building out of rats, and to supplement it by effective rodent destruction, plus the creation of deep rodent-free belts around boundaries, rather than to rely on such measures as mass prophylactic inoculation. (b) That, in countries where spread is mainly by wild rodents, the setting up and maintenance of barriers by gassing, poisoning and trapping plus an attack on domestic rodents, is strongly to be recommended in every case. (c) That, in countries where the domestic rodent problem is an important factor and where it defies control, prophylactic vaccination may have to be undertaken, in addition to such anti-rodent measures as are practicable."

II. Salient points regarding the history of plague in South Africa are well summarized as follows :—

" (1) From 1892 to 1905, plague was introduced at the ports and caused extensive outbreaks amongst domestic rodents and a considerable number of human cases in urban areas before it was eradicated from these areas. (2) From 1903 to 1905 striped mice (*Rhabdomys pumilio*) in the bush surrounding one or more of the ports became infected, and the infection spread slowly through the bush until it reached, in 1914, sandy country inland, where gerbilles were plentiful, when rapid spread all over the inland parts of the Union with isolated human cases occurred. (3) During the period 1914-1933, human cases were almost entirely infected from veld rodents, and domestic rodents were found infected in exceptional cases only. (4) During 1934-35, with the breeding up of veld rodents owing to favourable seasons, numerous waves of infection occurred, resulting in an increased number of human cases. Further, domestic rodents became infected in a considerable number of places. (5) The indications for the coming season are that cases of plague will again show an increase, owing to the fact that gerbille colonies have again multiplied enormously in the neighbourhood of former foci."

III. The position in Madagascar differs from that in South Africa, for there is no evidence here suggesting that wild rodents are concerned

in the transmission of plague to the rat or that they are a reservoir of plague. "The rat constitutes the animal reservoir which keeps the disease going." And yet it is the bush land of the high plateaux which furnished the greater number of plague cases. The chief plague problem is a rural one. Another point of importance which has been emphasized is that *X. cheopis*, the rat flea, is quite frequently found free of the rat in the dust of native houses, especially in the dark corners where temperature and humidity are constant. Moreover, fleas have been shown to be plague-infected "in huts in which a case of human plague occurred and in which no rats could be found." A new plague-carrying flea, *Synopsylla fouquernii*, has been identified on rats of the high plateaux, but only in the outside burrows, "Where *X. cheopis* never occurs."

In Madagascar a living attenuated plague vaccine has been used in man on a large scale. It is claimed that by its use the death rate from plague has been reduced by two-thirds and the general death rate from all causes by 50 per cent.

The possibilities of serum therapy have also received attention and the same living attenuated plague strain has been used, up to large doses, for the inoculation of the horses which provide immune plague serum. Doses are reached of two full Roux flasks of culture by intravenous injection.

IV. This is a short report dealing with the endemic manifestations of plague in Angola which have occurred since the end of 1932.

W. F. Harvey.

THORNTON (E. N.). **Plague.**—*Rep. Dept. Public Health South Africa 1934-35.* pp. 29-34. 1935. Pretoria. [Summarized in *Rev. Applied Entom.* Ser. B. 1936. Apr. Vol. 24. Pt. 4. pp. 76-77.]

"An epizootic of plague occurred among veldt rodents and in certain localities the incidence in man was high. Owing to the large amount of rat-proofing that has been carried out, urban centres were little affected. In the Orange Free State, where the disease was most prevalent, the summer of 1933-34 had been particularly favourable for the growth of the grasses on the seeds of which gerbilles feed and an enormous increase occurred among these rodents. In November 1934 waves of plague were reported to be destroying them, and the likelihood of domestic rodents becoming infected and so bringing about the infection of man was forecast. The incidence in man was highest in the south-western part of the Orange Free State where the Namaqua gerbille [*Desmodillus auricularis*] is abundant and the lobengula gerbille [*Tatera lobengulae*] is also found. The relative freedom of the northern part of the State may be attributed to the extensive destruction of veldt rodents in that area during the previous epizootic. The number of farms infected was very small compared to the extent of the epizootic, and this was probably due to the relative freedom of domestic rodents from infection. The chief intermediary between the gerbilles and man was the multimammate mouse [*Mastomys coucha*], although in a few instances *Mus (Rattus) rattus* was also involved. The floors of huts that could not be economically fumigated were dusted with calcium cyanide (cyanodust) and subsequently flamed with a blow lamp. Calcium cyanide in the form of calcid briquettes applied to rodent burrows by means of a rotary duster gave promising results."

TSURUMI (M.). L'épidémie de peste du Mandchoukouo en 1934. [**Epidemic Plague in Manchukuo in 1934.**]—*Bull. Office Internat. d'Hyg. Publique*. 1936. Feb. Vol. 28. No. 2. pp. 263–264.

Two regions were involved in this epidemic, Nungan and the railway line. A total of 898 cases of plague was distributed over 94 villages, which was about half the number of the previous year. The disease was entirely bubonic in form, while septicaemia and pneumonia were secondary. Not one of the 45,464 rats examined bacteriologically was found to be plague-infected, but in 36 cases a plague-like bacillus was found in the rodent *Citellus mongolicus ramosus*, Thomas. This rodent is considered as probably responsible for the propagation of plague in Mongolia and Manchuria. W. F. H.

PARREIRAS (Decio). Notas e estudos sobre a peste no nordeste do Brasil, problema nacional.—*Bol. Oficina Sanitaria Panamericana*. 1936. May. Vol. 15. No. 5. pp. 429–433.

WU LIEN-TEH, CHUN (J. W. H.), POLLITZER (R.) & WU (C. Y.). **Plague : a Manual for Medical and Public Health Workers.**

This book was reviewed on p. 726.

GREY (J. C. P.). **The Control of Plague in Java.**—*Malayan Med. Jl.* 1936. June. Vol. 11. No. 2. pp. 115–116.

The views of an outside observer on the important special measures of plague control which have been adopted in thickly populated Java are particularly valuable. Measures which have been tried and failed are isolation, fumigation, rat poisoning, prophylactic vaccine. Stress is now laid on the improvement of the houses of the people who live in the country districts with a view to breaking down "the close association between man and rat." That association is not so close in the towns. The officers of the Plague Control Service themselves "take no particular precautions against the disease," as it is considered that they are only at any appreciable risk in the course of their work, if they happen to "live and sleep (especially on bamboo beds) in the epidemic area."

The Javan house is built of bamboo posts, thatch (attap) roofs and is double walled. Improvement of such a house consists in replacing bamboo—including the bamboo of beds—with timber, the roof with tiles and closing the double space between the walls. When this is done the rats leave the houses "for more congenial breeding places." Unfortunately the process of improvement of the dwelling house is costly and the people are poor. Government loans are needed and are given to the householder. It is the owner who dismantles his own house and reconstructs it "with the help and advice of the officers." The reconstructed houses are inspected, passed and again re-inspected at intervals "to ensure they are properly maintained." The success of these measures is evident. Plague started in East Java, spread to Mid Java and is now in West Java. Reconstruction of houses naturally followed the same course. It can be shown that East Java is now practically free of plague, plague is disappearing from Central Java and the same thing is happening in those parts of Western Java where the kampongs have been reconstructed. With the reconstruction the houses become brighter and cleaner; the populace likewise seems to reflect in their lives this brightening up of their homes. W. F. H.

FOURIE (L.). **Field Work against Plague.**—*Proc. Transvaal Mine Med. Officers' Assoc.* 1936. Jan. Vol. 15. No. 171. pp. 43–58. With 24 figs.

The observations recorded in this paper have reference largely to the epidemiology of plague in the Eastern Cape Province, Orange Free State and Transvaal. Most of the human outbreaks have been restricted to the country districts and have affected natives much more than Europeans. They have been associated with mortality among domestic rodents resulting from an epizootic among gerbilles, with the multimammate mouse, *Mastomys coucha*, as the only agent of transmission from gerbilles to man. Although all the small indigenous species are susceptible to plague it is only the gerbille and the multimammate mouse which are important in the spread of plague. Two members of the gerbille family *Taterona* and *Desmodillus* are those concerned. The multimammate mouse is not an active animal and does not burrow to any great extent. It has acquired the habit of freely entering and taking up its abode specially in native dwellings and in outhouses but is very seldom carried in farm produce. "Being essentially a wild rodent . . . it is not found in towns . . . but only on their outskirts." Thus it can be understood why outbreaks occur in farms, and affect mostly natives, but do not occur in towns and villages. Human plague in towns is due rather to accidental infection by rats. It would be a disaster if plague spread to the rats in the Reef mines and became enzootic among them.

An intimate knowledge of the habits and behaviour of the gerbille is required for the early detection of the prevalence of a plague epizootic among them. W. F. H.

MEYER (K. F.) & EDDIE (B.). **Sylvatic Plague in California. Discussion of its Extent in the Years 1934 and 1935.**—Reprinted from *California & Western Med.* 1935. Dec. Vol. 43. No. 6. 18 pp. [15 refs.]

Much useful commentary and discussion of sylvatic plague or, as the authors insist it should be called, sylvatic plague, is contained in this pamphlet. The points raised are deserving of close attention and study. It has to be realized that in the Pacific States of the Union wild rodents play the most important rôle as reservoirs of the disease. "Only two (possibly three) human cases of plague have been recognized in 1934 and none in 1935." At intervals, however, epidemics have appeared among one or other of the wild rodents found in certain counties and it is now probable that this undue mortality has been a plague mortality. Such epidemics among squirrels and wild rabbits have previously been too readily ascribed to tularaemia and therefore not to have required systematic investigation. It is now known, of course, that many other rodents than the rat and mouse suffer from spontaneous plague. In South Africa nineteen different rodents have been found to be spontaneously plague infected. Sylvatic plague with all its possibilities has become of the greatest importance and may at any time become a grave danger to man. "Thus sylvatic plague has crossed the Pacific States and has appeared in the Rocky Mountain States. How far it has travelled in an easterly direction has not as yet been determined."

Two important observations are placed on record by the authors, one as to the fact that chronic latent plague may occur in man, and the other as to the probability that the "inapparent plague, or a *B. pestis*

infection without visible lesions," which has been established for the rat, the suslik and the tarbagan may occur in the Oregon squirrel. The physiological inactivity of these animals during hibernation may be an important factor in the determination of latency of a plague infection.

It is evident from this and other similar studies that the widespread existence of sylvatic plague demands careful investigation of the rodent species involved, their habits of life, their migrations, their hibernation, their ectoparasites and their natural enemies. The serum reactions of rodents may furnish valuable information, as also may experiments to determine the comparative susceptibility of the various species. [See this *Bulletin*, 1934, Vol. 31, p. 878.] W. F. H.

FENJUK (B.) & DEMJASHEV (M.). **Studies on the Migrations of Gerbilles by Means of Banding Method.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1936. Vol. 15. No. 1. [In Russian pp. 89–106. With 8 figs. [37 refs.] English summary pp. 107–108.]

An attempt was made to determine how far gerbilles migrate from their burrows. This was done by catching the animals, marking them, setting them free and recatching them. Out of a total of 1,361 gerbilles 210 with marks were caught. It was established that they might wander to a distance of 100 metres from their burrows for feeding purposes and that the track left by an animal in snow or sand might extend in 24 hours to as much as one kilometre. W. F. H.

KALABUCHOV (N.) & RAEVSKY (W.). **The Life Cycle of the Ground-Squirrel (*Citellus pygmaeus* Pall.) and the Laws of Development of the Plague Epizootic. IV. Ecological Peculiarities of the Ground-Squirrel at the Different Periods of its Yearly Life Cycle.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1936. Vol. 15. No. 1. [In Russian pp. 109–129. With 7 figs. [14 refs.] English summary p. 130.]

When newly-born squirrels appear above ground and disperse they come to occupy fresh burrows, some inhabited and some deserted. By their occupation of an old burrow the young animals may become infected through fleas left behind in nests where ground squirrels had died in an epizootic of the previous year. This dispersion of young animals therefore is the principal cause of annual epizootic outbreak and it will occur earlier or later in spring according to the climatic conditions of the locality. During the summer ground squirrels move only to short distances of a few hundred metres but the annual dispersion of young animals may lead to their travelling as much as 2–5 kilometres. W. F. H.

TUMANSKY (V. M.). Ueber den Beginn spontaner Pestepizootien unter Ziesel, *Citellus pygmaeus* Pall., und ihren Verlauf. [**The Beginning of Spontaneous Plague Epizootics among Ziesels and their Course.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1935. Vol. 14. No. 4. [In Russian pp. 419–424. German summary p. 424.]

It is generally accepted that plague epizootics among ziesels, *Citellus pygmaeus*, Pall., begin at the time of migration of the young animals. These observations tend to show, however, that ziesels may become infected soon after their awakening from winter sleep and, apparently,

at the time of mating. There is reason to believe that the early spring epizootics do not last long owing to the short duration of the mating season, after which these animals betake themselves to an individual mode of life. The epizootic is extinguished only to light up again on the second occasion of contact, which is the migration period of the young animals. At this time the epizootic is of longer duration and lasts up to the time of hibernation. W. F. H.

BUXTON (P. A.). Breeding Rates of Domestic Rats trapped in Lagos, Nigeria, and Certain Other Countries.—Reprinted from *Jl. Animal Ecology*. 1936. May. Vol. 5. No. 1. pp. 53–66. With 2 figs. [23 refs.]

Increased attention is at the present time being paid to biological data among the animals capable of transmitting disease to man. The usefulness of such data has been abundantly proved for wild rodents and forms the basis of rational preventive measures and epidemiology. In this article a strong case is made out for more careful investigation of the domestic rodent and its fertility is the main subject of discussion. A careful analysis of data already accumulated shows that there is a seasonal rhythm for pregnancies in every country for which the figures are available. "Generally speaking the breeding season appears to coincide with the warm season in temperate and subtemperate climates. But it appears that in places which have a monsoon . . . the relation between climate and breeding is not so simple. It seems probable . . . that breeding is largely a matter of nutrition; that may well depend on harvests and indirectly on climatic events."

Due and proper emphasis is laid, in the discussion, upon the statistical pitfall of selection for the collector of field data. The samples taken may not be truly random and the deductions based upon them may lead to wholly erroneous ideas "on the existing sex ratios or figures about pregnancy or the abundance of young rats. Young rats are more easy to trap than old ones and trapping may also be selective in respect of sex." Dilution is also the source of much error in many statistical findings. The amount of breeding which is going on may, for example, be obscured by the incursion of a large population of new-born animals, none of which is yet ready to breed. These will nevertheless dilute the totals on which percentages are calculated. Some standardization, at least of age, would be required to avoid the dilution of the new-born. In fact the usual statistical presentations of age, sex and other distributions, with controls, ought to accompany all field and laboratory data. These data, too, are apt to be meagre in other respects. Even the information which is available is not always utilized; we may have given us only an average figure or percentage, or, at most, these along with a maximum and minimum, instead of the much more useful frequency distribution, mean, range and standard deviation. Types of card for the booking of data derived from each captured rat are given, which might well be made use of as standard by the plague worker. W. F. H.

BONEBAKKER (A.). Over pest. Symptomen, verpleging en behandel-
ling. [**Plague Symptoms, Nursing and Treatment.**]—*Geneesk.
Tijdschr. v. Nederl.-Indië*. 1936. June 9. Vol. 76. No. 23.
pp. 1410–1423.

As this is a clinical lecture, much of it is taken up with the description of two cases of plague. Clinically, plague may be difficult to

distinguish from typhus. In plague a marked leucocytosis, which may reach 50,000 or over with a shift to the left, is of some value in doubtful cases. It is the blood culture, however, and especially the preliminary culture in bile, which is a great standby for diagnosis. It seldom fails. Of the complications of plague the most important are those affecting the lungs—bronchitis, bronchopneumonia and lobar pneumonia. Pneumonias, both in bubonic and septicaemic plague, can make a sudden appearance, a matter of considerable importance in the nursing of plague cases. Other complications are conjunctivitis—which may lead to keratitis, iridocyclitis and hypopyon-carbuncles and other pustular conditions. Among the less frequent complications are paralyses, meningitis-like symptoms, arthritis, diarrhoea and jaundice.

The nursing staff in attendance on plague cases should wear a simple mouth and nose mask of 4-fold gauze. It should also be a practice, in feeding a patient, to stand well behind him.

Treatment of plague is largely symptomatic. The author has used bacteriophage daily by intravenous injection and, in the case of bubonic plague, has injected 2 cc. on 4 to 5 consecutive days into the bubo. His impression is that this treatment was advantageous.

W. F. H.

LE GALL, SEYBERLICH & BRAULT. Peste septicémique à évolution anormale : guérison. [**Abnormal Plague Septicaemia : Cure.**]—*Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 351–353.

On admission to hospital the patient, whose daughter was already in hospital with bubonic plague, had a temperature of 38.5°C. On the next day his complaint was of some dyspepsia, a swollen and painful abdomen, violent headache and muscular pain in the lower limbs. His temperature was 39.2°C., his general condition excellent and there was no evidence of lymph node involvement. An examination of the blood showed malarial parasites. Treatment by quinine produced no improvement. A blood culture carried out on the third day gave a positive result for plague, which was fully confirmed by animal inoculation. Treatment consisted of a daily subcutaneous inoculation of antiplague serum and a fixation abscess. The serum treatment continued until the 13th day and the patient received altogether 320 cc. Recovery took place, which is an exceptional result, but is on record for septicaemic plague. In the discussion which followed it was pointed out that, even if delicate bacteriological tests were capable of demonstrating the presence of some bacilli in the blood, this did not mean a septicaemia in which the organisms were growing freely in the blood, as is the case in anthrax or in the terminal phase of plague. A few germs can be present in the blood without constituting a breakdown in the defence of the body. It is demonstrable, for example, in diseases like typhoid, pneumonia and tuberculosis.

W. F. H.

JOLTRAIN (E.). Cas de peste bénigne observés dans la région parisienne. Difficultés du diagnostic.—*Bull. Acad. Méd. Roumanie.* Paris. 1936. Vol. 1. No. 3. pp. 339–349.

BODET (H.). Note sur un cas de charbon pesteux.—*Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 345–346.

MADISON (R. R.). **Fibrinolytic Specificity of *B. pestis*.**—*Proc. Soc. Experim. Biol. & Med.* 1936. Apr. Vol. 34. No. 3. pp. 301–302.

With a plasma blood clot test it had been found that only streptococci and staphylococci produced a fibrinolytic enzyme. As, however, a negative result of test may be due to the presence in a plasma clot of neutralizing bodies the present investigation was carried through with a serum-free fibrin-clot technique. It has been found that, "in addition to certain pyogenic cocci all locally available strains of *B. pestis* are strongly fibrinolytic particularly when tested with rat or guinea-pig fibrin."
W. F. H.

FADDEEVA (T.) & TSCHERNOBAEW (W.). ***Bacillus pestis* in Mixed Culture. I. The Antagonism of Different Species of Bacteria relatively [to the growth of] *B. pestis*.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1935. Vol. 14. No. 4. [In Russian pp. 346–356. With 9 figs. on 2 plates. English summary pp. 357–358.]

A number of organisms have been examined in regard to their behaviour towards the growth of *Past. pestis*. Some are antagonistic and some tend to grow in symbiosis. Among the antagonistic organisms are found *Streptococcus mucosus*, the pneumococcus, nearly all the typho-coli group, *Bact. faecalis alkaligenes*, one strain of *Chromobact. prodigiosum*, one strain of *Ps. pyocyanea*, *V. cholerae* and *B. mesentericus*. Of the organisms which could grow in symbiosis may be mentioned *Sarcina*, *Staphylococcus aureus*, *V. paracholerae*, *Bact. ozaenae*, *Bact. aromaticum* and *B. subtilis*. Dysentery organisms seem to divide themselves between the two groups, nor does the grouping appear to proceed on very well defined generic lines.

W. F. H.

SAMSONOW (Th.). Ueber den Einfluss einiger Histolysate auf das Wachstum des *B. pestis*. [**The Influence of some Organ Lysates on the Growth of *Past. pestis*.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1935. Vol. 14. No. 4. [In Russian pp. 359–364. With 5 figs. German summary pp. 364–365.]

Lysates were prepared from liver and spleen, which contained (a) peptone, (b) peptone and traces of deutoalbumoses, (c) abiuretic products. One of these was added to Martin's agar in concentrations varying from 1–100 to 1–1,000,000. In the small concentrations the quality of the agar was distinctly improved for growth of *Past. pestis*, which could also be grown from a weak suspension, such as gave no growth at all on ordinary agar. The modified agar was capable of being heated and cooled without affecting its nutrient quality and could be preserved for 3 months.
W. F. H.

MORALES OTERO (P.). The Bacteriology of Plague. A Review.—*Puerto Rico Jl. Public Health & Trop. Med.* 1936. Mar. Vol. 11. No. 3. pp. 553–583. [83 refs.] [Spanish version pp. 584–616.]

DEVIGNAT (R.). Note sur une méthode pratique de recherche de l'infection pesteuse chez les rongeurs.—*Ann. Soc. Belge de Méd. Trop.* 1936. Mar. 31. Vol. 16. No. 1. pp. 43–45.

POKROWSKAJA (M.). Ueber prophylaktische Impfungen gegen Pest. [**Prophylactic Inoculation against Plague with Avirulent Living Organisms.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1935. Vol. 14. No. 4. [In Russian pp. 376–385. With 1 chart. [10 refs.] German summary pp. 385–386.]

An avirulent culture of the plague bacillus was obtained as a mutant from the action of bacteriophage on a virulent strain. This culture was tested for its immunizing properties on ziesels and guineapigs and gave mortality rates of 10 or 11 per cent. in the inoculated animals as against 80 or 100 per cent. in the controls. W. F. H.

SOKHEY (S. S.) with the technical collaboration of H. MAURICE. Un nouveau sérum antipesteux. [**A New Antiplague Serum.**]—*Bull. Office Internat. d'Hyg. Publique.* 1936. June. Vol. 28. No. 6. pp. 1097–1100.

The new antiplague serum is obtained by the immunization of horses. To begin with the horses are inoculated intravenously with avirulent cultures and later with virulent cultures and filtrates of cultures of 4 weeks in bouillon grown at 27°C. A special method of testing the efficacy of the serum is used and is based on the author's quantitative method of standardization of plague antigen (this *Bulletin*, 1936, Vol. 33, p. 367). It consists of using graduated doses of the test serum and injecting each of these doses into a group of 5 mice of about 3 months' age. The mice receive subcutaneously on the other side the standard infecting dose of plague bacilli, 0.5 cc. 1–1,000,000 dilution of a 48-hr. bouillon plague culture of standard virulence. That dose of serum which saves more than half of the animals injected is taken to be the protective dose. By this method of measurement the protective dose in cc. was found to be :—new serum 0.05, buffalo serum of Naidu 0.3, Pasteur Institute serum 0.5 and Lister Institute serum 0.5. In previous trials of plague serum therapeutically it had been found that, once bacillaemia was established, it was quite ineffective. In order to test this point for the new serum a technique has been devised, based on the observation that mice receiving subcutaneously the standard injecting dose developed bacillaemia in about 72 hours with 100 per cent. mortality in 5 to 9 days. Such mice, commencing treatment at 72 hours with 0.9 cc. new serum subcutaneously, given in 3 daily doses of 0.3 cc. each, showed a saving of 70 to 80 per cent. of the test animals. A small series of human cases gave 3 deaths out of 17 for the new serum and 13 deaths out of 17 controls. W. F. H.

IWANOWSKY (N.) & FADDEEVA (T.). Einwirkung des Chloroforms auf das Antipestserum. [**Action of Chloroform on Antiplague Serum.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1935. Vol. 14. No. 4. [In Russian pp. 404–409. With 2 figs. [10 refs.] German summary p. 410.]

The action of chloroform on the protein constituents of antiplague sera was determined by shaking the two up together. The following conclusions are drawn :—(1) Precipitation, mainly of the globulin fraction, takes place. (2) The rate of precipitation depends on the amount of chloroform added and the duration of the shaking. (3) The precipitation brought about by shaking with chloroform is an adsorption phenomenon and is correlated with the presence of emulsifying

substances. (4) In the process the titre of the antibodies, agglutinins and precipitins, diminishes at a rate which is parallel to the loss of globulin. W. F. H.

SOUKNEV (V.), JOUKOW-WEREJNIKOW (N.), FAWORISSOWA (B.) & KASANZEVA (E.). **Combined Treatment of Plague with Bacteriophage and Envelope, Paris and Nucleoproteid Anti-Sera.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1935. Vol. 14. No. 4. [In Russian pp. 387–392. [12 refs.] English summary p. 392.]

In these experiments the various sera were injected simultaneously with the testing dose of plague bacilli. The Paris serum, obtained by immunization of horses with living plague organisms, prolonged the life of test animals on the average to 23.67 days, the nucleoproteid serum to 7.6 days, the anti-envelope serum to 9.4 days and the bacteriophage to 4 days. Control animals lived for 4 days. The best results were obtained by combining bacteriophage with an antiserum, where the former acts as a vaccine under the protection of the passive immunity given by the latter. W. F. H.

KURAUCHI (K.) & HOMMA (H.). Nouveau vaccin antipesteux purifié et concentré et titrage de son efficacité. Recherches sur la fraction antigène spécifique du bacille de la peste. [**New Concentrated Plague Vaccine, its Efficacy. Specific Antigenic Fraction of the Plague Bacillus.**]*—Bull. Office Internat. d'Hyg. Publique.* 1936. June. Vol. 28. No. 6. pp. 1088–1096.

According to the authors of this note the plague bacillus contains two independent antigens one of which is contained in the capsule and the other in the body of the organism. It is the antigen of the capsule which is specific and efficacious in producing immunity (S.I.F. or "specific immunizing fraction"). The antigenic protein of the body is not efficacious and only contributes to producing an unwanted reaction. If immunization with a single dose is desired it is necessary to use the S.I.F. solution absorbed by metallic salts and in the form of an emulsion. Used in this way the vaccine develops less secondary reaction because absorption is slowed. Titration of a test S.I.F. vaccine is effected by means of a comparison with the flocculation occurring between a standard dried solution of S.I.F. and the homologous antiserum. One unit of this vaccine signifies the quantity of S.I.F. corresponding to 1 mgm. of bacillary substance cultivated at 37°C. and about 20 units are sufficient for immunization in man. W. F. H.

GIRARD (G.) & ROBIC (J.). La vaccination de l'homme contre la peste au moyen de bacilles vivants (virus vaccin E.V.). Son application à Madagascar. [**Plague Vaccination of Man with living Bacilli.**]*—Bull. Office Internat. d'Hyg. Publique.* 1936. June. Vol. 28. No. 6. pp. 1077–1087.

Notices of the use of E.V. vaccine have appeared in this *Bulletin* (1935, Vol. 32, p. 850, and 1936, Vol. 33, p. 366). The strain used in preparation is avirulent for the guineapig and rabbit by subcutaneous and other injection. Intraperitoneally it may be lethal in large doses. All guineapigs vaccinated with this living strain have withstood very severe tests, corresponding to thousands of fatal doses and to the test of infected *X. cheopis*, which killed a control guineapig in 5 days. The

large scale vaccinations carried out in human beings have already been referred to and the conclusion is now drawn that:—"The mortality from plague has been reduced by two-thirds in the vaccinated as compared with the controls and the general mortality from all causes by 50 per cent." It is to be noted also that, (a) not a case of primary or secondary pneumonia has occurred in the vaccinated as against 17 among the controls, and (b) septicaemia has been much less apparent in the vaccinated than in the controls dead of plague. *W. F. H.*

LONG (J. D.). Choice of Rat Poison in Antiplague Work. Rat Poisons used by the National Antiplague Services of Ecuador, Peru, Chile, and the Argentine Republic.—*Public Health Rep.* 1936. May 1. Vol. 51. No. 18. pp. 551-554. Also in *Bol. Oficina Sanitaria Panamericana.* 1936. June. Vol. 15. No. 6. pp. 519-522.

The "prime requisite" in a rat poison is that it should be slow in action to permit of the rats leaving the spot where it has been eaten, carrying their fleas with them and dying, as is their habit, in an inaccessible place as remote as possible from either rat or human contact. Such a poison is to be found in commercial arsenic. Methods of deratization by poisoning are only temporary, but may have to be adopted and frequently repeated by communities too poor or too scattered to employ "ratproofing and other antiplague measures of more permanent value." Change of type of poison bait before rats become used to it, its generous use and careful distribution are some of the essentials of a satisfactory poisoning campaign. Formulae of some of the poisons used are:—(1) *Poison packets*:—coarsely ground corn meal 35; cheap wheat flour 35; grated cheese, ground dried fish, dried blood, finely ground dried meat or finely ground peanuts 15; commercial arsenic 15. Put up in paper packets containing one teaspoonful. (2) *Fish poison*:—Cheap fresh fish without bones 85; commercial arsenic 15. Spread as paste on bread, banana leaf, paper or shavings and place near rat runs. (3) *Fresh blood poison*:—Fresh blood from the slaughterhouse boiled down to a jelly 60; barley flour or meal, wheat flour, finely ground corn meal or ground salt fish, to give consistency, 25; commercial arsenic 15. Spread as in the case of fish poison.

Few accidents have occurred, considering that in Guayaquil, Ecuador, 17,691 pounds of poison packets and over 40,000 pounds of fish poison were used. "The use of the poison packets has caused the death of chickens, some domestic animals, such as cats and dogs, and occasionally a burrow (ass). . . . One child was poisoned." This child ate 10 packets; his brother, who ate 6 packets, did not die. "The amount of arsenic in a single packet is just about sufficient to kill an animal the size and weight of a rat." *W. F. H.*

YACOB (M.). A Note on the Use of Cyanogas "A" Dust as a Raticide and Pulicide.—*Indian Med. Gaz.* 1936. June. Vol. 71. No. 6. pp. 336-338. With 1 fig.

The chief advantage of cyanogas over the "*bhoosa-battis*" commonly used for smoking out rat-holes in the Punjab is that it penetrates much better. It can destroy both rats and fleas at a distance of 15 feet, whereas the *bhoosa-battis* does not reach to more than 10 feet for rats

and 5 feet for rat fleas. Moreover "about one-eighth of all the *bhoosa-battis* soon become extinguished after the rat holes are closed with mud" and therefore fail in their object. Perhaps the chief disadvantage of the cyanogas is the element of danger in its use. This is, however, small with a competent staff. W. F. H.

PEIRCE (E. R.). Mesures adoptées contre les rats à Liverpool. [**Anti-Rat Measures at Liverpool.**]—*Bull. Office Internat. d'Hyg. Publique*. 1936. June. Vol. 28. No. 6. pp. 1119–1128.

These measures are given in great detail and will repay direct consultation in the original communication. W. F. H.

LEESON (H. S.). **Further Experiments upon the Longevity of *Xenopsylla cheopis* Roths. (Siphonaptera).**—*Parasitology*. 1936. July. Vol. 28. No. 3. pp. 403–409. With 3 figs.

Previous experiments were carried out on unfed fleas (this *Bulletin*, 1932, Vol. 29, p. 839) and, contrary to the view of BACOT and MARTIN, it was then found that "there is no direct proportion between survival of unfed fleas and saturation deficiency of the atmosphere at any temperature." In the present series of experiments the fleas were fed before being starved and the same result emerged, that "there was no direct proportion between survival times and saturation deficiency." It was found that "fleas fed once before starvation lived longer than unfed fleas and fleas kept with the host for 7 days before starvation survived still longer." W. F. H.

SASSUCHIN (D.), IOFF (I.) & TIFLOW (W.). Materials for the Study on the Parasites and Enemies of Fleas.—*Rev. Microbiol., Epidémiol. et Parasit.* 1936. Vol. 15. No. 1. [In Russian pp. 27–44. With 15 figs. [52 refs.] English summary p. 44.]

REVIEWS AND NOTICES.

FEDERATED MALAY STATES. **Annual Report of the Institute for Medical Research for the Year 1935** [KINGSBURY (A. Neave), Director].—pp. vi+126. 1936. Kuala Lumpur : Govt. Printer. [50 cts. or 1s. 2d.]

In spite of the absence on long leave during the last three-quarters of the year of the heads of four divisions of the Institute, and the persistence of "depression-level" funds, this report records much valuable research and no diminution of routine work, the demands for vaccine-lymph having been exceptionally heavy.

Drs. J. W. FIELD and J. C. NIVEN are making a comparative study of the therapeutic efficiency of Atebrin musonate, Atebrin and Quinine bihydrochloride. Daily parasite counts, the duration of fever and the numbers of re-admissions to hospital are given. The urinary excretion of the drugs has also been followed daily: atebrin has been detected continuously up to the 41st day after a 7-day course totalling 2.1 gm.: it has been found in the urine within 10 minutes of intramuscular injection of the musonate and within 90 minutes after oral administration. Up to the end of the year 583 cases of acute malaria had been treated. "The findings indicate that atebrin musonate is a valuable drug, particularly perhaps in benign tertian infections, though severe nervous symptoms, following treatment, have been noted in two sub-tertian cases."

A year's extensive comparative field trial of atebrin and quinine in prophylactic use was commenced in September by the same officers in collaboration with the Malaria Commission of the League of Nations. The figures suggested that "up to the end of 1935 atebrin had been relatively effective," while those obtained with quinine had been better than expected. Interesting findings can also be expected from concurrent anopheline surveys commenced by Mr. G. H. CORBETT.

Continuation of the Selangor Coast Survey resulted in the taking of nearly 6,000 anophelines, of which some 4,500 were dissected. Out of 980 specimens of *A. barbirostris* trapped in one area 11 were found infected. Certain chemical examinations were undertaken of 159 samples of water in which larvae were taken. *A. hyrcanus* var. *sinensis* and *A. vagus* were often found associated with salt-water species such as *A. sundaicus*.

Notification of an impending change in the diesel oil to be supplied for M.D.B. (Mosquito Destruction Board) mixture, has necessitated further laboratory and field experiments.

A laboratory investigation of spray compared with spray-brush methods of anti-larval oiling showed little difference in the efficiency of "disturbed" spray brush and "undisturbed" spray oil.

The blood of each of 16 specimens of the Malayan Flying-fox was found to be infected with a plasmodium: infection was attempted without success of over 100 mosquitoes of several different anopheline and culicine species, nor did infection follow injection of the bat's blood into three different species of monkey and a loris.

A decrease has been noted in the incidence of tropical typhus on certain oil-palm estates, after they have been in bearing for some years. The decrease is not easily explained. More infections have occurred on rubber estates.

Further progress is recorded in researches by Drs. R. LEWTHWAITE and S. R. SAVOOR in tropical typhus. [See also this *Bulletin*, 1936, Vol. 33, pp. 424 ; 433.]

The outstanding finding of the year has been noted to be the experimental carriage of rural " K " virus by *Xenopsylla cheopis*. After the original difficulties in maintaining the " K " virus in guineapigs, and the strain had become well established, passage through fleas seems to have caused a reversion to the type of early passage " K " virus. Bodies morphologically resembling *R. orientalis* have occasionally been seen within the nuclei of endothelial cells of the peritoneum and its exudate (mammalian tissue), recalling such bodies as those described by WOLBACH in epithelial cells of the gut, hypoderm and salivary glands of ticks infested with Rocky Mountain Spotted Fever virus.

Peritoneal exudate is a regular feature of " K " virus lesions in the guineapig and has been found to contain 10,000 to 100,000 Minimal Infective Doses per 1 cc., while anterior chamber fluid of the eye of infected rabbits may contain 70 to 300 M.I.D. for the guineapig. Numerous attempts have been made to utilize these exudates in the production of a prophylactic vaccine, with hopeful results from a few experiments using peritoneal exudate.

Other points in regard to typhus research include :—

- (i) Successful storage of " K " virus in peritoneal exudate for 11 days at 0° to -5°C.
- (ii) Staining of *R. orientalis*.
- (iii) Protective value of human convalescent serum.
- (iv) Immunization commenced of a horse against " K " /Japanese River Fever virus.
- (v) Skin reaction following intracutaneous inoculation of " K " virus.

The Vegetable Oil Section of the United Planting Association of Malaya is making a contribution towards the cost of a rat-virus enquiry ; poisoning and other methods of rat destruction may also be considered.

An attempt is being made to popularize the local use of palm oil in human dietary. Dr. J. A. SIMPSON is therefore undertaking an investigation of its carotene content in connexion with the refining required prior to human consumption. The oil is expected to be a valuable source of energy and by virtue of its carotene content it may be regarded as an indirect source of vitamin A.

Medico-legal requests for the determination of blood groups from blood stains have led Dr. J. A. CHELLIAH to investigate under local conditions various possible techniques and the effect of age on the stain. Experimentally agglutinins were detected in saline extracts from fairly large stains for a week or two, and by a test of absorption of agglutinins from normal Group O serum by scrapings of the stain positive results were obtained even after 9 months.

After prolonged investigation with the Hortvet cryoscope of the freezing point of the milk of local cows and buffaloes, Dr. J. A. SIMPSON has been able to establish the test as a valuable additional method of detecting added water.

Other general points dealt with include :—

- (1) the keeping qualities of a sample of dried insulin : no deterioration was found over 6 months at room temperature.
- (2) racial distribution of blood groups ;

- (3) effect of the Mohammedan fasting month on carbohydrate metabolism ; on healthy young adults no alteration of the glucose tolerance curve was detected ;
- (4) Friedman's modification of the Zondek Ascheim Test : 11 successful tests.
- (5) Weekly complement fixation tests by a pooled stock of Wassermann positive serum, in dilutions from 1/10–1/160, as an additional check on the standardization of complement.

The visits of Dr. V. B. WIGGLESWORTH towards the end of 1934 and of Dr. J. J. C. BUCKLEY during 1935, both from the London School of Hygiene and Tropical Medicine, have been greatly appreciated. Dr. Buckley has tentatively identified the cercariae, which appear to cause a special dermatitis, "Sawah itch" among rice-field workers, as of *Schistosoma spindalis*, a parasite of bovines. P. H. Martin.

ROCKEFELLER FOUNDATION. **Annual Report 1935** [MASON (Max), President].—pp. xv+479. With 20 plates. New York : 49 West 49th Street.

That part of the Annual Report for 1935 of the Rockefeller Foundation which refers to Public Health and Medical Science is a record of work of which the Foundation may justifiably be proud. The President, Members and Officers consider that the Rockefeller Foundation has, by now, sufficiently demonstrated, in many countries, the feasibility of the control of diseases by local health organizations ; in future it can render the best service by carrying out research, both in the field and in the laboratory, which will lead to the acquisition of new facts, and a more effective and economical method of control.

In the report for 1934, an account was given of several outbreaks of yellow fever, in districts in South America, where *Aedes aegypti* is not found. In 1935, many cases of this "jungle yellow fever" were discovered in Goyaz and other parts of South Central Brazil, an area of over one hundred thousand square miles, from which the disease had never been reported previously. Jungle yellow fever occurs in open country, but not in the towns. Both clinically and pathologically it is identical with urban yellow fever, and produces the same lesions in mice and monkeys. The mode of transmission to man is not known. Much work was done in 1935 in the Rockefeller laboratories in New York, on possible methods of immunization against yellow fever. In order to attenuate the virulence of the virus, it was grown in tissue cultures, but it was not considered safe to use it alone ; it was therefore given with immune serum. As the supply of the latter from human sources is very limited, human vaccination was found to be impracticable on a large scale. The serum of immune goats was tried, but gave unpleasant reactions ; with the immune serum of monkeys much better results were obtained, and this method is being tested in Brazil.

At Fiumicino, in Italy, anti-mosquito work has been very successful. In 1926, when the work was begun, over 5,000 anophelines were caught at certain fixed stations ; in each of the three years, 1933, 1934 and 1935, only one specimen was taken at the same places ; and the number of dispensary malaria cases fell progressively from about a hundred to only two in 1935. Active malarial measures are also being carried out in Albania, Portugal and elsewhere.

The prevalence of tuberculosis is being investigated at several places in the United States, in Jamaica and Austria ; and special attention

is directed to the incidence of the disease in the same family, and to the relationship between tuberculosis occurring in childhood, and subsequently in the adult.

A survey was made of the distribution of yaws in Jamaica, where the disease and its treatment were the subjects of intensive study. Flies of the genus *Hippelates* were found to be capable of conveying yaws from man to the rabbit. These small flies often hover about the eyes, and have been suspected, for a long time, of causing severe conjunctivitis in man; in both cases, the part that they play is probably a mechanical one.

Substantial grants were made for the furtherance and improvement of public health nursing in several countries, and nearly two hundred fellowships in public health were given.

During 1935, a little more than half of the Foundation's expenditure on medical science was devoted to the advancement of psychiatry, including clinical neurology, anatomy, physiology and pathology of the nervous system, and some aspects of psychology. Contributions were made to certain schools for training and research in these subjects, and fellowships were given to well-qualified workers in this field.

The subjects mentioned above are only a few of those dealt with in the Report; as usual, the whole of it is of much interest, and merits careful study.

H. J. Walton.

NOCHT (Bernhard) [Dr. Med., Dr. Med. H. C., Hamburg] & MAYER (Martin) [Dr. Med., Dr. Med. Vet. H. C., Hamburg]. **Die Malaria. Eine Einführung in ihre Klinik, Parasitologie und Bekämpfung.** [Malaria; its Symptomatology, Parasitology and Control.] 2nd Enlarged Edition.—pp. iv+172. With 24 figs. & 2 coloured plates. 1936. Berlin: Verlag von Julius Springer. [Rm.15.60].

This is the second edition of a book published originally in 1918. It is based on lectures given to army doctors and medical men proceeding to the tropics. The book contains a good, and practical account of malaria on the usual lines; as much of it is necessarily rather elementary, there is little scope for originality, but it is thoroughly accurate, and represents quite adequately the present state of knowledge of most aspects of the subject.

A large proportion of the space is given to treatment, and this is particularly well discussed. The pathogenesis and treatment of blackwater fever are also considered at some length, and useful advice is given about the treatment of malaria in patients who have withstood an attack of blackwater fever. The pathology of malaria, antimalarial measures, mosquitoes and their control, are disposed of rather summarily.

The authors state that the book is not intended to be a complete treatise on malaria, but a guide to the subject for non-specialist practitioners; there is no doubt that they have attained their object, and more.

H. J. Walton.

FOSSEN (Arie). **Over maligne halslymphkliergezwellen.** [Malignant Tumours of the Cervical Glands.] [Thesis for Doctorate of Medicine, Medical High School, Batavia.]—102 pp. With 7 figs. on 3 plates & 1 chart. [56 refs.] 1936. Batavia-C. Kolff & Co.

This is a doctorate thesis on a condition which is by no means uncommon in Java and Sumatra. Malignant growth of the glands of the

neck is seen among Chinese and Malays alike. Some are lymphosarcomata, some reticuloendotheliomata, others what have been described by ROULET as retiothelsarcomata. The two latter arise in the reticulo-endothelial elements of the glands, but by special staining methods reticulin is shown to be present in the latter, absent from the former. Whether this is to be ascribed to different grades of anaplasia or explained by the theory that the reticulo-endotheliomata arise in the germinal centres of the follicular part of the glands which are also practically devoid of reticulin is not yet decided.

Again, these neck tumours may be secondary, *i.e.*, metastases from buccal or nasopharyngeal growths, occurring early before the primary has been recognized. The author has borne this in mind and in his cases examined these cavities post-mortem when he had opportunity and found that so many patients dying from these tumours of the neck had no signs of any primary growth elsewhere that he believes most of them to be cases of primary gland tumours. A painstaking piece of work.

H. H. S.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

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[No. 12.

PELLAGRA AND PELLAGRA-LIKE CONDITIONS IN WARM CLIMATES.

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SECTION III.*

Having discussed some of the less commonly recognized features in the symptomatology of pellagra in the last Section, I shall now deal with a number of conditions, variously described by authors, which I believe are pellagrous in nature or are closely related to pellagra.

As mentioned above, glossitis is a common symptom in pellagra and one which may antedate those upon which a diagnosis is made, by months or years. In 1925 and in 1930 I drew attention to the outbreaks of epidemic glossitis among natives, described by observers in Africa and elsewhere and suggested their probable relationship with pellagra. They will be briefly referred to again here.

H. JAMIN (1925) described from Tunis what he called "stomatite d'automne," an affection coming under observation each autumn, in which the patient complains of a sensation of heat and tingling in the buccal mucosa. The chief lesion consists in a desquamatory glossitis with similar changes on the gums, lips, cheeks, and soft palate.

The same year M. NOGUE (1925) published an account of epidemic glossitis in December at Dakar, Senegal, occurring chiefly among native children. A characteristic denudation of the tongue, generally affecting the anterior third, was seen, often associated with similar lesions on the inner surfaces of the lips and cheeks and excoriations at the angles of the mouth, giving rise to a macerated appearance. This condition caused a burning sensation in the mouth on eating. In some outbreaks gastro-intestinal symptoms were also noted and it was observed that both tended to clear up together on improved feeding. It was suggested that the ingestion of peppermint and salt-fish played a part, but it is more important to remark the seasonal incidence of the condition.

C. MATHIS & GUILLET (1925), who had the opportunity of seeing the cases described by Nogue, add fissuring and hypertrophy of the papillae of the tongue to the picture. They attempted to demonstrate

* Section I appeared in the October issue (pp. 729-741) and Section II in the November issue (pp. 815-825).

a causative organism but no positive evidence was advanced and the condition remained unexplained.

J. MONTPELLIER, A. CATANEI & L. COLONIEU (1927) have published observations on an affection, differing little from the above, met with in Algiers, but gastro-intestinal symptoms and seasonal variation were not noted.

A rather similar condition was described by J. KATZENELLENBOGEN (1928) in Palestine as one of the most common and distressing complaints among labourers living on a monotonous diet chiefly of preserved food and legumes. The malady was seen in the months December to February and on grounds which would appear entirely unconvincing was considered as due to the pneumococcus. The glossitis was accompanied by inflammation of the lips, soreness at the angles of the mouth and in many cases the throat was also involved. After some six to eight weeks the condition improved.

M. G. BLACKLOCK (1925) remarked what would appear to be this same form of glossitis among many of the school children of Sierra Leone which gave rise to local discomfort but no other symptoms.

None of these authors has demonstrated any cause for these conditions and at the same time none has suggested the possible link with pellagra.

These outbreaks of epidemic glossitis with a seasonal incidence should be compared with (a) the condition described by J. T. BRADLEY (1929) among the inhabitants of the outlying islands of Seychelles, called "décoquée" in which soreness at the angles of the mouth, soreness and redness of the eyelids, erythematous rash on the genitalia, scrotum or vulva, were associated with variable knee-jerk and sometimes affections of vision and hearing. It was noted that sufferers improved if they went to the mainland and that those in a position to obtain a better than the average diet did not suffer.

(b) The "Outbreak of Exfoliative Glossitis in an Assam Jail" published by G. H. FITZGERALD (1932), and (c) the condition described as "The A and B avitaminosis disease of Sierra Leone" by E. J. WRIGHT (1928) and (1930).

Under the designation Exfoliative Glossitis G. H. FITZGERALD described an outbreak of disease in one-third of the inmates of the Gauhati Jail, Assam, consisting of a glossitis in which progressive denudation occurred, with the production of a large, indented, fissured, red-glazed tongue with enlarged red papillae, associated with a generalized stomatitis, salivation and fissuring at the angles of the mouth with heaped-up white sodden epithelium.

Gastro-intestinal symptoms occurred in 37 per cent. of cases; flatulence and eructations, abdominal pain about the umbilicus and oppression after food. Tingling in the hands and feet was noted in 2.75 per cent., a pellagrous-like eruption on the dorsa of the hands and feet occurred in 2 per cent. There was no diarrhoea but a previous history of "Flexner" infections was obtained in 30 to 40 per cent. of those affected.

The outbreak occurred in the autumn of 1931 and the cases were watched only till April 1932. In March an attempt was made to see the effect of treatment by diet. Improvement took place in 70 per cent. of those from whose diet certain irritative elements were eliminated (chillies); in 70 per cent. of those to whom 2 drachms of cod-liver oil were administered daily, while improvement in 92 per cent. was seen

in those to whom cod-liver oil and 1 ounce of yeast were given, and in 93.75 per cent. of those to whom yeast alone was administered.

After improvement had been thus shown with a few weeks' treatment, all groups were placed on the standard diet with condiments; active lesions again appeared in 22 per cent.

The jail diet consisted of:—Rice 12 chittaks, salt 7/16, dal 2½, vegetables 3, mustard oil ¼, condiments ¼, antiscorbutics ¼.

The affection described by WRIGHT in Sierra Leone was observed throughout the year but had a marked seasonal predominance towards the end of the rainy season, when there is an annual shortage of food. The symptoms in order of appearance had reference to the tongue, the angles of the mouth, eyes, nose, anus, scrotum, and vulva, and the nervous system. The first named symptoms are identical with those described in pellagra by STANNUS (1912 and 1913). In addition the texture of the skin of the limbs and trunk in Wright's cases was altered by a keratosis which caused it to be dry and rough. The nervous symptoms included variable knee-jerk, tongue tremor, sensations of tingling, heat, cold or numbness, impaired vision and hearing, later Rombergism, inco-ordination, ataxia, paresis of limbs.

There is much to suggest that the affections described above under the term "Glossitis" are, in fact, examples of early pellagra, or rather what has been termed prepellagra as mentioned in a previous section. Together with "décoquée" they form a series of conditions leading up to that described by FITZGERALD, which would be recognized I think by any pellagrolologist as pellagra. In commenting upon the affection met with by WRIGHT in Sierra Leone STANNUS (1930) remarked "with very little hesitation one may suggest that his cases are cases of pellagra."

In attempting a differential diagnosis from that disease, WRIGHT says "pellagra with which the disease might be confused is commonly found in the white races"—a remark somewhat beside the point. Again he says "In pellagra (*cf. syn. Alpine Scurvy*) there is a condition of the gums similar to that produced by a vitamin C deficient diet"—showing thereby some misconception upon the point. Further, in a table of differential diagnosis, Wright states that wasting, effusions and oedema, salivation, pyrexia, painful deglutition, irritability and insanity are present in pellagra but absent in the Sierra Leone disease—thus failing to realize, I think, that pellagra may present a very varying picture and that all or none of these signs may be present in that disease. Further he states that deafness, diminished skin sensibility, foot- and wrist-drop which he finds in Sierra Leone do not occur in pellagra, a statement which needs some modification. Lastly in regard to the skin WRIGHT appears to think that in pellagra the lesion is always of the nature of an acute erythema on exposed areas only and that keratosis does not occur, thereby exhibiting a disregard for what is known about the skin in pellagra. Enough has been said to suggest that this attempt at differential diagnosis breaks down when subjected to careful scrutiny. The Sierra Leone disease is, in my opinion, pellagra in all possibility.

FITZGERALD believed that a diagnosis of an early pellagrous condition seemed a probable one in his cases. There can be little doubt he was correct in his surmise, in spite of the fact that skin lesions comparable to those of pellagra were only noted in two cases. I would add that probably the irritative elements in the diet served to determine the mouth as the chief site of the pellagrous exanthem.

One of the more recent communications upon these pellagra-like conditions is that by J. V. LANDOR & R. A. PALLISTER (1935) describing an affection characterized by what they call "eczema" of the scrotum, "eczema" of the angles of the mouth and superficial glossitis, followed later by symptoms of combined degeneration of the cord and poor vision, occurring among the inmates of the prison at Johore Bahru and due, in their opinion, to an avitaminosis B₂.

On 29th August, 1933, among a total of 393 prisoners, 138 had stomatitis and the affection of the scrotum, 59 stomatitis only, 8 scrotal affection only. The free margin of the prepuce in some cases and more rarely the anus exhibited changes similar to those at the angles of the mouth. The descriptions and photographs demonstrate clearly that these conditions are the exact counterpart of those described by STANNUS in African pellagrins, though in many of these Johore cases the scrotal condition appears to have been complicated by a *tinea* infection. About 2 or 3 months after entering the prison nearly 50 per cent. of prisoners developed some or all of these symptoms. The "attack" lasted a few months and was unaffected by an experimental change in diet. In earlier cases, if looked for, pain, tingling, "pins and needles," and numbness in the lower extremities, haziness of vision, and increase of knee-jerk, were discovered. Later pains, stiffness, and weakness in the legs were complained of. Rombergism and an ataxic gait developed and sensibility to touch, pain and deep pressure in the leg, arm and abdomen were affected, even sometimes the face. Vision might be 6/60 but complete blindness was never seen. The pupils reacted, but light reaction was sometimes poorly sustained. No case of night-blindness or xerosis was observed. Mentally some of the patients were dull.

All those showing nervous symptoms had been in the prison over a year. In Johore 9 of 140 prisoners who had been in prison a year, of the total of 393, showed nervous system affection. In Singapore the figures were 34; 461; 1,210. Those working as cooks appeared to escape the disease. The malady is said to have been noticed in Johore prison for 30 years past. It may also be seen in the poorer members of the outside population. Among prisoners, Chinese, Malays, Indians and one European have all been affected. The affection has also been noted in the Kuala Lumpur Prison, the Mental Hospital at Singapore and among the boys of the Singapore Reformatory.

Investigation showed no more than a mild anaemia in some cases. Four of 17 cases showed achlorhydria.

The results of treatment were interesting: 50 early cases were "cured" after 15 gm. marmite daily for 1 month, 20 relapsed within a month of ceasing to take it! Cod-liver oil and orange juice had no beneficial effect. Four ounces fresh yeast daily cured most cases as did autoclaved yeast, but the best results were obtained by giving half a pound of liver daily. The authors say "The relationship of the disease described and classical pellagra is interesting but a little obscure." Pellagra does not occur in Malayan prisons though sporadic cases do occur in the general population and three such cases are cited—a hawker, a fisherman and a ricksha-puller. All had, besides the classical exanthem, diarrhoea. The hawker had a stricture of the rectum, the fisherman rectal ulceration. The ricksha man had the affection of the lips and scrotum as seen in the prisoners.

Again, the pellagrologist would have no hesitation, I think, in pronouncing this condition described by LANDOR & PALLISTER to be

pellagrous. In this series of cases the high incidence of the pellagrous scrotal skin affection was quite possibly determined by the tinea infection. One wonders if in these cases some other manifestations of pellagra would not have been detected by the trained eye; the hesitation to make the diagnosis of pellagra has been due apparently to the absence of the classical exanthem.

P. MANSON-BAHR (1935) in a letter referring to this paper by LANDOR & PALLISTER and their observations upon the lips, tongue and angles of the mouth, states that he noted the same conditions present in 181 of 1,461 individuals examined in Ceylon (when studying sprue) among Sinhalese, Tamils, Japanese and Malays alike. The condition was not associated with diarrhoea; at that time he thought it was due to eating dried fish.

D. G. Fitzgerald MOORE (1934) has described a condition of considerable interest among native school children in Nigeria. While 12 per cent. of the boys, who were boarders and poorly fed, suffered from the affection, no cases occurred among those that lived at home and none among the girls who were taught cooking. In all some 300 cases were seen in five years. Some cases were also seen among the poorer ill-fed casual labourers who lived on cassava, dried-fish, oil, suet, pepper. At the beginning there was a sore tongue and mouth with aphthous lips; a dry scaly itching condition of the scrotum or vulval irritation supervened, followed later by dimness of vision and loss of central acuity, but unaffected fields. In these cases a diagnosis of retrobulbar neuritis was made and later pallor of the temporal halves of the discs was seen. Some patients complained of epigastric pain and achlorhydria might be present. The diet of these schoolboys consisted of one cabin biscuit and cassava soup—"gari," with only 3 oz. of meat a week, practically no protein and much of the cassava was bad.

During the holidays the condition got better or in early cases treatment with marmite, oleum morrhuae, iron and "tombo"—a fermented palm sap—yielded good results. The author notes the resemblance of these cases to Wright's cases in Sierra Leone but in one there was retrobulbar neuritis, in the other group the cornea was affected.

He believes there is a dietary deficiency involved, but also that "gari" acts as a toxin.

The interest of this group of cases is obvious, linking up as it were, some of those considered above. Once more, I should hazard the diagnosis of pellagra in the Nigerian school-children.

The next communication of interest is by L. NICHOLLS (1933 and 1934). He describes a syndrome which he found to be common among the inmates of a gaol in Ceylon consisting of a dry furfuraceous skin and a rash consisting of enlarged sebaceous glands plugged with altered sebum, which may become surrounded by a darkly pigmented areola. This rash has a characteristic distribution on the thighs, the external surfaces of the arms near the elbows, the abdomen and across the shoulders, and occurs less commonly on the face, neck and chest, as is well shown in his photographs. The associated symptoms are dimness of vision, a "neuritis" resembling that of pellagra, "burning sensations of the hands and sometimes of the feet," numbness and tingling of the legs, weakness, xerophthalmia, and often death. Diarrhoea was common, possibly due to "Flexner" infections. Most of these prisoners came from an indigent class among whom dry skin and keratomalacia are not uncommon. To the skin condition he gives the name "Phrynoderma"—toad skin.

Later L. NICHOLLS (1935) refers to the bewildering variety of clinical nervous symptoms met with in the cases mentioned above and notes their resemblance to those seen in children and in women towards the end of pregnancy or during lactation, well and long recognized in Ceylon. They include burning of the palms and sometimes of the soles, tingling, numbness and weakness, often later mild paresis, ataxia, and rombergism, loss of joint sense, inco-ordination, coarse tremor and at this stage loss of deep reflexes. In children phrynoderma is associated with emaciation and keratomalacia. Examinations of the central nervous system of such children post-mortem showed many degenerate fibres in the posterior nerve roots and posterior columns with scattered degeneration in the lateral and anterior columns, and in the anterior roots.

These cases of NICHOLLS' are examples, one might suggest, of chronic pellagra. The condition he calls phrynoderma is no new condition—it has been described by many other writers on pellagra as mentioned in Section 2. His reference to "the bewildering variety of clinical nervous symptoms" is peculiarly interesting as this is particularly true of pellagra.

Of interest too is a reference by L. NICHOLLS (1933) to a condition he had observed many years before among indentured native African labourers which affected them within a few weeks of their arrival as healthy individuals at the Magadi Soda Factory, East Africa. It was characterized by a dry goose-skin-like condition due to an enlargement of the sebaceous glands into papules together with a furfuraceous desquamation. Associated with this condition there was what he called a mild form of neuritis; later diarrhoea supervened and many deaths ensued. NICHOLLS says that a similar condition occurred in the Native Carrier Corps in East Africa during the War.

These conditions, in my opinion, might well be pellagrous, though not recognized as such.

Now NICHOLLS was acquainted with pellagra many years before in the West Indies but I believe at that time no diagnosis of pellagra was ever made in the absence of the text-book trinity of symptoms, and perhaps for this reason he has failed to identify the Ceylon affection with that disease.

We owe another description of this pilo-sebaceous folliculitis to L. J. A. LOEWENTHAL (1933). He described a skin condition among the inmates of the Uganda Central Prison which he considered was due to a vitamin A deficiency. He thought it had not been previously recorded, the only account of any condition resembling it, which he knew of, being one by PILLAT, though in his opinion the two were not identical. One hundred and thirty cases were found in the prison at Mulago, most of whom also exhibited xerophthalmia and night-blindness. Similar cases were later discovered in the prison at Nairobi when sought for.

The lesions he describes under several headings:—(a) general dryness of the skin of the body (but not of the face), which becomes rough and grey-black in colour, the greyiness depending on the desquamation. It is most marked on the backs of the hands, the front of the legs, both surfaces of the thighs and across the buttocks, and causes itching. (b) Smooth-topped, shiny papules, distributed over the exterior surfaces of the arms, the anterior and external surfaces of the thighs and sometimes on the buttocks, loins, chest and back. (c) A folliculitis in which the mouths of the pilo-sebaceous follicles are sealed

with a mass of horny tissue accompanied by hyperkeratosis in the immediate neighbourhood and deep black pigmentation. (d) Acne. As the cases clear up the contents of the follicle are extruded leaving a black macule. The diet consisted of maize 20 oz., beans 5, dry meat 2, nut 3, suet $\frac{1}{2}$, sweet potato 10 oz. The cases quickly improved with the exhibition of vitamin A-containing substances, *viz.*, one ounce of cod-liver oil.

LOEWENTHAL has given a perfect account of the pilo-sebaceous lesions as they occur in pellagra; the association with the dry rough skin condition, as described, further links these cases up with that disease. The resemblance of this condition to that recounted by NICHOLLS is obvious, further made good by xerophthalmia in both sets of cases. In the Ceylon cases, however, there were added nervous manifestations.

I must here digress for the moment to discuss what, for short, I will call the "folliculitis" as above described.

G. P. GOODWIN (1934) has described the same condition in a child aged 10 in a London hospital as a "cutaneous manifestation of vitamin A deficiency." Associated with the "folliculitis" (I was very kindly given the opportunity of seeing the boy) there was dryness of the skin, particularly noticeable over the legs and feet; the nails of the fingers and toes looked drier than normal; "a small area of moist eczema was present at the left angle of the mouth"; injection of the cornea was noted; "the tongue was red and smooth being denuded of its superficial papillae"; the gums were swollen; no xerosis, no gastro-intestinal symptoms. Dr. Helen MACKAY (1934) in reviewing the subject of "vitamin A deficiency in childhood" suggests that in more advanced cases, to the above-mentioned symptoms might be added periods of diarrhoea, emaciation, scaly pigmentation followed by a shrivelled condition of the skin, with powdery or flaky desquamation, xerosis and mental apathy—a condition which, leaving out the question of causation, I suggest might well be included under the designation of pellagra.

A. PILLAT (1929) writing from Peiping in an article on keratomalacia among the Chinese includes under this heading xerosis conjunctivae and xerosis corneae as well as keratomalacia proper. He finds that night-blindness may be found in these patients and that besides these are many other associated signs including a pale grey colouring of the skin of the face, neck and forearms, which later becomes yellowish. The skin may be puffy and the face look bloated. The skin becomes covered with "a remarkable quantity of scurf," like "powdered flour," and there is an affection of the sebaceous glands, causing large numbers of comedones on the face, the secretion remains in the ducts and the skin about them becomes black. The skin is dry and rough, due to hyperkeratosis; in some cases ulceration occurs, referred to by PILLAT as Dermomalacia. The hair is dry and falls; the nails become dry, furrowed and white. There is decrease in hydrochloric acid secretion, diarrhoea, hoarse voice, bronchitis, and a genito-urinary affection all of similar nature, *i.e.*, a disturbance in the nutrition of epithelial cells, due, he thinks, to a vitamin A deficiency.

The resemblance of LOEWENTHAL's cases to the condition described by PILLAT and of both to pellagra is obvious.

Another recent paper is one by J. HARKNESS (1935). He has described what he considered to be a deficiency disease among natives of the Bukoba district of Tanganyika Territory whose diet consisted chiefly of cooked bananas, small quantities of ground-nuts, and beans, and but very rarely fish, meat or milk.

The chief symptoms were night-blindness, with ulceration of the cornea in some cases, and chronic enlargement of the parotid glands. The tongue was sore, glazed, and tremulous or coated in the middle and red at the margins with denudation, the gums were also sore. "Dermatitis is seen, and in the early case the skin is slightly swollen and the seat of burning and itching. A butterfly patch over the nose and molar regions is present." Casal's necklace is more rarely to be observed. The hair of the outer side of the eyebrow is lost and the nails are brittle and cracked. "In later stages the skin is thick and rough, especially on the elbows and backs of the hands . . . the patient becomes dull, stupid, and subject to dementia. Intractable diarrhoea, emaciation and death in advanced cases occur." Profound atrophy of the intestinal mucosa was found post-mortem. The author believes the condition to be pellagra, and there can be little hesitation in agreeing with him.

In a *Contribution à l'étude des syndromes d'avitaminose* A. DUMONT (1934) cites cases met with among native labourers in the Bas-Congo. He appears to believe that in beriberi there are two syndromes, the one comprising the cardiac condition and oedema due to shortage of vitamin B, the other including the neurological manifestations due to toxic-infections by various organisms which come into play as a result of gastro-intestinal disturbance. Among his cases, however, are a number exhibiting symptoms very reminiscent of pellagra rather than beriberi; conjunctivitis, blepharitis, a plaque of hyperkeratosis under each eye, a rhagades-like condition at the palpebral and buccal commissures, infiltrated tongue, gingivitis, the mucous membrane being depolished and covered with a grey adherent pellicle. There was no affection of the cornea. He speaks of the "syndrome oculo-buccal," and thinks it has affinities with scurvy. It clears up upon an hyper-vitaminic diet.

The last of these recent papers which I shall include here is that by N. L. CORKILL (1934) concerning pellagra among a small group of millet-eating people living to the N.E. of Khartoum, Sudan. Pellagra among millet-eaters in Egypt has been recorded by W. H. WILSON (1921) but only two cases of the disease had been previously noted in the annual Reports of the Sudan Medical Service. Although the diagnosis of pellagra was made by CORKILL his cases are included here as the diagnosis rested upon all the less common manifestations of the disease to which I have drawn attention and no case of frank "text-book" pellagra was seen. The history of the discovery of the malady in the Butana country by CORKILL is well worth being read as an example of how illusive pellagra may be. The data were collected during two visits to the district of only a few days and many of the facts gradually emerged in conversation with the people.

Putting two and two together he found a group of symptoms which included weakness, wasting, flatulent dyspepsia, a history of diarrhoea, "burning pains" in the extremities (almost diagnostic—it occurred in nearly 90 per cent. female and 80 per cent. male cases), pains in the body, head and limbs, vertigo, abnormal knee-jerks, mental symptoms, etc. There was a history that night-blindness was common among these cases. There was also a history of burning pain in the skin followed by swelling, dermatitis, desquamation, and pigmentation. Pilo-sebaceous gland dysfunction, powdery desquamation and "sulphur flake" were noted. Typical glossitis, stomatitis, pigmentation of the gums and angular stomatitis were found to be present, but

there is no mention of the similar conditions of the prepuce, anus and vulva, nor of any affection of the scrotum, probably because the necessary examination was not carried out. Finally there was a seasonal incidence associated with the symptoms.

Lastly reference must be made to H. STRACHAN's observations in Jamaica upon a series of cases, among which there were undoubtedly some of pellagra, as I have previously pointed out. At the time he ascribed the malady which he recorded as due to malaria, though he remarked that there were many features suggestive of beriberi. His observations were first noted in *Sajous's Annual* (1888), his paper later appearing in the *Practitioner* (1897). Among the symptoms were "burning pains in the palms and soles," numbness and cramps in the hands and feet; the palms and soles showed hyperaemia and fine desquamation and became more and more deeply pigmented as might the whole body; there was branny desquamation at the margins of the eyelids, lips and nostrils; the corners of the mouth, the prepuce, anus and vulva were the seats of excoriation; hyperaemia of the conjunctiva and of the mucous membrane of the mouth with loss of surface epithelium of the tongue were noted; emaciation was marked and a number of deaths occurred.

There were besides, references to an odd medley of nervous symptoms; some of these suggest pellagra, but H. H. SCOTT, criticizing Strachan's reports, thinks that he without doubt included under the one heading of Peripheral Neuritis a variety of cases of all kinds.

In 1930 I referred to SCOTT's interesting description of an acute outbreak of "central neuritis" in Jamaica and to his observations upon the resemblance of the nervous lesions found to those in pellagra, though he thought the evidence was against the condition being acute pellagra or any other deficiency disease. He rather believed this Jamaican outbreak was due to an intoxication, the toxin entering by the mouth. It is just worthy of note, however, that the epidemic occurred among adult native labourers, male and female, on sugar estates during the cutting of the cane crop, and ceased when this operation was over. The onset was very acute, 50 to 100 new cases occurring per day.

The first symptom was always a conjunctivitis with swelling and redness, photophobia, ulcers and abrasions of the lids. The second symptom was burning of the mouth, which was red, inflamed, and the site of apthous ulceration with fissuring at the angles of the lips. The tongue was not sore as a rule and salivation not common. Some two weeks later either (1) diarrhoea set in, from which recovery might take place spontaneously without further symptoms or from which the patient died, or (2) constipation with nervous symptoms developed, consisting of "burning in the toes and soles of the feet," a feeling of numbness and tingling, spreading up the leg causing inco-ordination and difficulty in walking but no loss of power or sensation, absent knee-jerk but no wasting. The upper limbs might be similarly affected and later there might be diminution of visual and auditory acuity and a peculiar steppage gait which remained permanently. The ordinary diet of these people was deficient in protein but contained an excess of carbohydrate and consisted of yam, bread-fruit, cocoa, peas, beans, corn-meal, salt-fish, etc., but during the harvesting the workers lived almost entirely on sugar cane.

"Burning pains" in the soles of the feet and in the palms of the hands is a symptom so constantly recurring in the descriptions of the

symptomatology of pellagra that I have come to consider it as one of considerable importance and great diagnostic value. The non-mention of this symptom in some accounts I believe does not necessarily mean that it was not present, as in many cases only such signs are given as to warrant a diagnosis of pellagra. It will have been noticed in discussing the pellagra-like conditions above how often this symptom has been noted.

In the pages which follow I have tried to give the history of the recognition of this manifestation as it has been described as a separate symptom.

On November 5th, 1825, J. GRIERSON, Esq. (1826), attached to the Arracan division of the army, presented a paper before the Medical and Physical Society of Calcutta entitled "On the Burning Feet of Natives." "It exists," he says, "in various degrees of severity, from an uneasy harassing sensation of heat and tingling to the painful extreme of burning, destructive of sleep and appetite in the first instance and latterly of serious injury to the general health." The affection may also include the palms of the hands, aching along the tibiae is a common accompaniment, and giddiness may supervene. The condition may be unconnected with other troubles or may be associated with "febrile and bowel complaints."

Grierson did not know of any previous observations on the malady but refers to an affection of the soles of the feet among Laplanders, for which the bark of the beech is used "as a remedy for unpleasant symptoms resulting from checked perspiration."

In a footnote to this paper there are some remarks concerning treatment of the condition by Mr. PLAYFAIR (1826).

"Burning of the feet" was described by Assistant-Surgeon MALCOMSON of the Madras Medical Establishment (1835) as occurring in Madras sepoys at Ava during the Burmese War, when subjected to fatigue and exposure, on a diet consisting of rice, 2 oz. ghee, a little salt-fish and spices, and was differentiated from beriberi.

WARING (1860) in an article under this same heading, states, almost unknown before the first Burmese War in 1825, it is an affection much more commonly seen in Arracan, Burmah, the Tenasserine Provinces, Penang, Singapore and other eastern settlements and less commonly in India. The symptom of burning feet may be the only one present but "most generally appears as a sequel of fever, bowel complaints, rheumatism and beriberi and is not infrequently concomitant with some form of leprosy." The mention of leprosy is interesting as it seems possible that a pellagrous eruption was here mistaken for leprosy. This author quotes MALCOMSON as considering the affection to be "connected with scorbutic disease," he also points out that the palms of the hands may be similarly affected. The anterior part of the foot is chiefly the seat of the pain, the instep and heel less, according to GRIERSON.

WARING also quotes MCKENNA "The precursory symptoms . . . languor, loss of appetite; pain in extremities . . . shooting over body . . . more acute in larger joints; countenance anxious and cachectic . . . bowels usually regular, sometimes seized with looseness: debility, irritability, sleepless nights, emaciation: burning and pricking at the soles of the feet and palms of the hands, in due course diffused over the whole body with exacerbations by day and remissions in evening with sundown: exhaustion and sometimes death."

PLAYFAIR is also quoted as pointing out that there are two types of the malady—in the one sweats occur, in the other the skin is dry and scaly ; again a significant observation.

BILLOD cites HURST as saying that " Burning Feet " among Cipayes (Sepoys ?) was attributable to the use of damaged rice.

J. N. DUGDALE (1928) writing upon " Burning Feet " in *Estate Medical Practice in Malay* found the condition most commonly in middle-aged, ill-nourished coolies who had been in the country months rather than years. There was no redness and rarely swelling but sometimes engorgement of blood-vessels. There was an associated peripheral neuritis (*sic*) with wasting and rombergism. Sir David GALLOWAY is quoted as having been familiar with the condition for 40 years, and Dr. WILSON knew of it in Johore. In correspondence A. B. J. COOPE (1928) stated that in Johore the condition was confined to Tamil coolies, and associated with night-blindness and evidence of scurvy—swollen gums, emaciation, harsh dry scaly skin, variation in pigmentation and cracks in the lips. The affection occurred in periodic waves at times of economic stress ; it responded to antiscorbutic treatment. Assistant-Surgeon W. RAY (1902) alludes to a few cases of pellagra in N. Behar in which " burning of the skin of the feet and hands " was a prominent symptom, associated with reddish areas of skin, roughness and dryness ; the tongue was red and dry, and diarrhoea was present but no nervous symptoms were noted. W. B. MORGAN (1929) refers to the condition—" a deep seated burning sensation " in the soles of the feet—as common among Tamil emigrants to Malay, recruited from S.W. Madras but not among Telegus who take a better diet. The symptom appears after twelve months' residence in Malay and is associated with insomnia, mental depression and nostalgia. " More than half of these patients showed small black cutaneous nodules over the external surface of the legs and forearms." Nitroglycerine was given on the supposition that there was over-stimulation of the sympathetic nerves due to a deficiency of vitamin B group, and a diet of maize-raggi, eggs and mutton. Cure is said to have been thus effected in two weeks. This affection is seen in Singapore, Deccan and in Ceylon, but not in Java and Sumatra, it is stated.

BRAHMACHARI (1923), referring to an outbreak of epidemic dropsy in 1919-1920 at Krishnagar when 127 out of a total of 171 cases came under observation, places " burning pain " in the soles and palms as among the most common symptoms. It was associated with pains in the calves of the legs, anorexia, diarrhoea, weakness, anaemia, and oedema. The knee-jerks were normal in 90 per cent. of cases. No mention was made of skin lesions.

J. C. R. BUCHANAN (1932) has recorded interesting observations upon a condition which attracted his attention " by the universality of its occurrence in Somaliland " among the natives, one of the chief symptoms being " burning feet." One hundred cases were analysed : Pain of rheumatic type was almost universal—general aches ; pain in joints, bones and muscles ; headache and backache ; tender shins. " Burning feet " and itching or tingling of the skin also constituted a characteristic symptom in 39 per cent. " Burning palms " was noted in 3 only of the 100 cases. Oedema, in the vast majority of cases confined to the legs, occurred in a large proportion. Severe pyorrhoea was very general among them and epigastric pain occurred in 45 per cent.—a dull heavy pain, worse after food, but the appetite was not affected ; constipation was the rule ; the urine showed no albumin. In 15 cases

there was some myocardial involvement. Some of the ordinary signs of pellagra such as skin changes, soreness of the tongue and lips, diarrhoea and psychosis were noted among these people.

This disease, if it can be so called, is a very chronic one; "it may go on for ten years without producing much more than slight disability—and would appear to be seldom if ever fatal." The condition occurs among various groups, jungle native and townsman, on rather different diets, but the author remarks "It can be said that these diets contain most of the essential elements but that they lack variety and balance; it is doubtful if the vitamin content is always adequate." The margin of safety is small, it is said, but it is noteworthy that in the several group-diets meat and milk appear, though fresh vegetables are completely absent. The results of treatment were interesting: Of 22 cases treated by intravenous injections of 10–25 minims of tinct. iodi. in 4 to 8 cc. distilled water, twice weekly, 19 improved. Of 17 given an addition of yeast and onion to their diet 14 improved. On combined treatment 10 out of 11 improved. The author thinks that the condition resembles the "pre-beriberi" of V. MAHADEVAN & T. K. RAMAN (1930). This seems rather doubtful as in these authors' cases the prominent symptoms described as those of larval beriberi consisted of numbness and tingling with areas of anaesthesia of the skin of the lower extremities, diminished or absent knee-jerk and tenderness of the calf muscles. BUCHANAN's cases would appear to have closer affinities with pellagra.

L. R. SHARPLES (1929) has described "Burning Feet" among Hindu Bengalis born in British Guiana and notes that it is not seen in the rest of the population. It is much commoner among the women, and between the ages of 17 and 40. The hands may also be affected, the pain is worst in the tips of the fingers. Patients also complain of "darkness of the eyes," *i.e.*, that their vision is impaired (? night blindness). There may be rombergism and in severer cases some anaesthesia on the dorsa of the feet but no paresis or wasting. No anaemia is found though ankylostome infections are universal. The diet consists of milled polished rice, and flesh is eaten. Symptoms subside on a good mixed diet being given.

These various groups of cases of "Burning pain" in the soles of the feet and palms of the hands, it will be noted, have been described as having other associated symptoms in most cases. Considered together they would appear to have a close similarity to other groups of cases, before mentioned, allied to pellagra.

Reviewing all the conditions which I have suggested are pellagra-like we see a number of affections in which some one or more symptoms are associated to form a series of syndromes, but all the various symptoms in the several syndromes are symptoms met with in pellagra. Some of these affections are obviously frank pellagra, some might be called pre-pellagrous states or larval pellagra.

In some of the syndromes one or two symptoms appear to dominate the picture rather to the exclusion of others, with considerable variation in the several groups, but the linking and overlapping is very remarkable when all are considered in series.

In collecting together in the form of a summary the various conditions which form the subject of this article it has been my purpose in the first place to help towards the better understanding of the symptomatology of pellagra and secondly to stimulate further interest in that disease and pellagra-like affections.

Shortly I hope to publish a reasoned discussion upon the aetiology of the disease and some points in its pathogeny.

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TROPICAL OPHTHALMOLOGY.

A REVIEW OF RECENT ARTICLES. XXVI.*

Trachoma.—MACCALLAN¹ defines trachoma as "a specific contagious disease of the conjunctiva in man. It is chronic in nature. It is characterized by a sub-epithelial infiltration of the conjunctiva by a cellular exudate, which spreads to the cornea and to the tarsus. It is followed by cicatricial changes in the affected tissues." The inflammatory cells may cause no obvious follicle formation, but merely induce a widespread subepithelial infiltration which makes the conjunctiva red and velvety. Bleblike excrescences, which emit a gelatinous material, form in the tarsus during the second stage of the disease owing to a blocking of the ducts of the meibomian glands. The conjunctival secretion in the first stage shows no pathognomonic chemical or microscopical changes, and reliance must be placed on the characteristic vascularization of the upper fifth of the cornea, which is detected by the slit-lamp.

Research by PULVERTAFT² into the nature of the follicles found in the second stage of trachoma has led him to suppose that these are not true follicles, but excrescences due to blockage of the meibomian ducts owing to cicatricial contraction of the tissues. True follicles do not undergo degenerative changes, and their contents cannot be expressed. He found that the histological changes in the disease are comparable with those occurring in many sub-epithelial inflammations—such as chronic superficial glossitis. The sub-epithelial tissues are densely infiltrated with small round cells—mainly lymphocytes, with some plasma cells: the pathological lesions are in no way distinctive, but are merely the familiar ones of inflammation and incomplete repair.

MARCUS & WAINER³ have studied the varieties of cells found in trachomatous material. After reviewing the observations of other pathologists they describe their own technique. The smears are made from the retrotarsal fold without using much pressure, and after drying, are fixed in ethyl alcohol. Giemsa's stain (1–2 drops per cc. of distilled water) is used to stain this preparation from 45 to 60 minutes. Eosin-azur II is also strongly recommended: 1 per cent. aqueous solution of eosin with azur II, 8–9 drops of the solution is added to 50 cc. of distilled water and the slide is stained for from 30 to 45 minutes. They are unable to confirm the findings of some writers that the predominance of certain cells is characteristic of the different stages of trachoma. Polychrome erythrocytes and normoblasts were found in all stages. Lymphoblasts, some undergoing mitosis, varied in numbers from 1 to 10 per field. Lymphocytes are very plentiful in the early stage of the disease, but become more scanty with its progress and very few are found in the third stage. Eosinophiles were very rare, and this paucity

* For the twenty-fifth of this series see Vol. 33, pp. 448–453.

¹ MACCALLAN (A. F.). The Relationship between Conjunctivitis and Trachoma. —*Brit. Jl. Ophthalm.* 1936. June Vol 20. No. 6. pp. 346–350.

² PULVERTAFT. The Nature of the So-called Follicles in the Second Stage of Trachoma (Tr. IIa).—*Rev. Internat. du Trachome.* 1936. Jan. Vol. 13. No. 1. pp. 19–23. [10 refs.]

³ MARCUS (J. M.) & WAINER (K. G.). La cytologie de la conjonctive dans le trachome et les conjonctivites folliculaires.—*Rev. Internat. du Trachome.* 1936. Apr. Vol. 13. No. 2. pp. 68–82.

constitutes a valuable diagnostic feature. The epithelial cells show more marked degenerative changes than in other forms of conjunctivitis.

BRUCK⁴ has noted the peculiar rarity in Palestine of pannus in trachomatous patients, though entropion and trichiasis are common. He attributes the blindness which is rife to secondary infections by Koch-Weeks and the gonococcus. He was impressed by the early age at which trachoma develops.

Farid MASSOUD⁵ after a study of 4,000 trachomatous patients, concluded that the disease was mainly acquired in infancy and that faulty diet and bad personal hygiene added to local irritation played an important part in its causation. Over-feeding and improper diet appeared to be more deleterious than actual under-feeding. Over-feeding is common among the babies of the poorer classes in Egypt.

SÉDAN⁶ has recorded the history of an Armenian family in Marseilles which consisted of a trachomatous grandmother, father, mother and two elder children, with three non-trachomatous younger children. Two of the latter contracted measles and shortly afterwards developed trachoma, whilst the third remained free from both diseases. He attributes this infection to the fact that the children were looked after by their trachomatous brothers during the measles at a time when their conjunctival resistance was lowered by the disease. Their trachoma proved to be of an obstinate nature despite drastic treatment.

CHARAMIS⁷ has reported favourably upon Brecker's treatment of the disease by the injection of detoxicated bee venom beneath the conjunctiva of the lids.

Cornea.—DUGGAN & NANAVATI⁸ have reported their experience of tattooing corneal leucomata with gold and platinum chloride. Twenty-nine opacities were tattooed with gold chloride and fourteen with platinum chloride. Tannin in 1 per cent. solution, used as a reducing agent, was found to be more painful than hydrazin hydrate, and produced a lighter tint. After an interval the stained area tends to become smaller and somewhat mottled, but the final result is satisfactory.

Cataract.—WRIGHT⁹ expresses the opinion that though the question may be doubtful, cataract really is exceptionally common in India. Of 2,000 outdoor workers between the ages of 40 and 60, resident in a dry and arid district, the cataract incidence was one person in 5.1. Of 2,000 working in a humid and fertile area (West Coast) the incidence was one person in 3.4.

⁴ BRUCK (A. J.). Sur le trachome en Palestine.—*Rev. Internat. du Trachome*. 1936. Apr. Vol. 13. No. 2. pp. 98–104.

⁵ MASSOUD (Farid). Trachoma as an Endemic Disease in Egypt.—*Rev. Internat. du Trachome*. 1936. Apr. Vol. 13. No. 2. pp. 111–118. [21 refs.]

⁶ SÉDAN (Jean). Deux cas de contamination trachomateuse familiale après conjonctivites morbillieuses préalables.—*Rev. Internat. du Trachome*. 1936. Jan. Vol. 13. No. 1. pp. 48–50.

⁷ CHARAMIS (J.). Le traitement du trachome par le virus d'abeille.—*Rev. Internat. du Trachome*. 1936. Jan. Vol. 13. No. 1. pp. 27–34.

⁸ DUGGAN (J. N.) & NANAVATI (B. P.). Tattooing of Corneal Opacity with Gold and Platinum Chloride.—*Brit. Jl. Ophthalm.* 1936. July. Vol. 20. No. 7. pp. 419–425.

⁹ WRIGHT (R. E.). Incidence of Cataract at Certain Age Periods in South Indian Districts.—*Brit. Jl. Ophthalm.* 1936. Sept. Vol. 20. No. 9. p. 545.

Glaucoma.—KIRWAN¹⁰ has investigated the occurrence of primary glaucoma in patients suffering from epidemic dropsy. He remarks that this is the only general disease at present known in which glaucoma forms an integral part, and is consequently of vast importance as it provides such a field for research. Epidemic dropsy is an entirely different disease from beriberi; its two outstanding manifestations are the vaso-dilatation of the whole capillary system and an increased permeability of the capillary endothelium. It appears to be associated with the ingestion of diseased, stored, parboiled rice. Gram-positive organisms with certain special characteristics are frequently found in the stools, and similar organisms have been recovered from diseased rice. The canal of Schlemm and the neighbouring tissues appear normal; also the epithelium of the ciliary processes, but the latter are extremely hypervascular and there is great dilatation of the choroid capillaries; inflammatory changes are, however, absent. In the aqueous humour of patients suffering from epidemic dropsy glaucoma there is a marked increase of the albumens while the globulins remain the same. In a certain number of patients suffering from the disease a histamine-like body has been proved to be present in the aqueous humour. The enormous number of 1,695 cases was seen during 1934 and 1935.

Miscellaneous.—In an article on myopia in China RASMUSSEN¹¹ remarks how very common the condition is in the country. He attributes this to gross over-strain of accommodation and convergence, owing to the bad conditions in which work of various kinds is carried on. Progressive myopia is, however, extremely rare. Trachoma and corneal ulcers account for most of the blindness in China.

CHAKRAVERTI¹² has furnished some excellent hints to the general practitioner on the subject of difficulties likely to be encountered in ophthalmic practice. He states "the eye is a delicate organ and as such it should be handled with extreme gentleness and care. The mildest medicines, namely, normal saline lotion and boric lotion, liquid paraffin drops and boro-vaselin should as far as possible only be prescribed." He lays proper emphasis on the connexion between inflammations of the skin and conjunctivitis, and also advocates mild applications in cases of trachoma.

BUSCHKE¹³ has reviewed the rôle played by the vitamins in ocular nutrition, especially lens nutrition. He quotes the observations made by various authorities and stresses the importance of considering the mutual interaction of the different essential food factors.

¹⁰ KIRWAN (E. O'G.). The Aetiology of Chronic Primary Glaucoma.—*Brit. Jl. Ophthalm.* 1936. June. Vol. 20. No. 6 pp. 321-331. With 5 figs. & 1 coloured plate.

¹¹ RASMUSSEN (O. D.). The Incidence of Myopia in China. Data and Theses from Periodical Investigations covering Thirty Years Residence and Association with Refracting and Hospital Centres in a Score of the Larger Cities.—*Brit. Jl. Ophthalm.* 1936. June. Vol. 20. No. 6. pp. 350-360. With 1 fig.

¹² CHAKRAVERTI (C. R.). Pitfalls in Ophthalmic Practice.—*Indian Med. Gaz.* 1936. Apr. Vol. 71. No. 4. pp. 199-203.

¹³ BUSCHKE (Wilhelm). Die Vitamine in der Ophthalmologie.—*Ztschr. f. Vitaminf.* Berne. 1936. Jan. Vol. 5. No. 1. pp. 37-68. [4 pages of refs.]

Toxic amblyopia is not very common in the tropics. ORR's¹⁴ observation on its treatment with acetylcholine is nevertheless interesting. He assumes that arteriole constriction is chiefly responsible for the symptoms, and in support of his hypothesis quotes DUGGAN's successful use of sodium nitrite intravenously. He injects intramuscularly 0.1 gram of acetylcholine (B.D.H.) or 1 cc. of acecholin (Anglo-French Drug Co.) daily for a week, and claims very marked success in three chronic cases. He suggests that the treatment may be of use in retinitis pigmentosa.

¹⁵The *Bulletin of the Ophthalmological Society of Egypt* (Vol. 28, 1935) contains many interesting papers by members of the Society. Contributions to the study of conjunctival disease are, perhaps, the most important. FARID MASSOUD directs attention to the necessity for care as regards personal hygiene and diet of the trachomatous patient in addition to ordering local treatment. Rapid improvement in the conjunctival condition is noticed when a bath is taken daily. Most of the members agreed that infection due to prevalent ophthalmias played an important part in the incidence of trachoma. R. P. WILSON remarks that very mild cases of trachoma may be met with; these may undergo a spontaneous cure, but evidence of vascular invasion of the cornea can always be found in them. Some of the conjunctival conditions in school children diagnosed as trachoma are not trachoma at all. IBRAHIM AHMED MAHOMED has found conjunctival eosinophilia to be much more common in Egyptians than he expected. Eosinophilia occurs quite often in trachomatous patients and is unconnected with spring catarrh. WILSON in a study of the seasonal incidence of acute ophthalmias was struck by the suggestive fact that the minimum summer incidence coincides with the fall in the number of flies. M. A. H. ATTIAH discusses the clinical aspects of phlyctenular disease in Egypt. M. KHALIL describes fully Lacarrère's method of cataract extraction by diathermic coagulation. An unusual type of lipoid infiltration of the cornea is described by A. M. SOLIMAN. M. A. ATTIAH and M. SOROUR record their experiences of treatment of corneal ulceration by the injection of an extract of placental tissue and umbilical cord.

H. Kirkpatrick.

¹⁴ ORR (H. Campbell). Acetylcholine in Tobacco Amblyopia.—*Brit. Med. J.* 1936. July 11. pp. 69-70.

¹⁵ BULLETIN OF THE OPHTHALMOLOGICAL SOCIETY OF EGYPT. 1935. Vol. 28. Session 32 pp. xxx+271. With numerous illustrations.

THE TYPHUS GROUP OF FEVERS.

QUARTERLY BULLETIN OF THE HEALTH ORGANISATION. LEAGUE OF NATIONS. Geneva. 1936. Mar. Vol. 5. No. 1. pp. 140-151.—**Typhus (Rickettsiosis)**. [Report of Committee on Typhus Fever and Resolutions of Pan-African Health Conference, Johannesburg, Nov. 20-30, 1935, pp. 140-141.] CLUVER (E. H.). **Typhus and Typhus-like Diseases in South Africa** [Annex I. pp. 142-149]. [20 refs.] DE BOER (H. S.). **Typhus Fever in Uganda and its Control** [Annex II. pp. 149-151].

i. In the opinion of the Committee tick typhus (tick bite fever) and flea-borne typhus do not constitute serious public health problems in S. Africa, they are as a rule mild diseases and are non-epidemic.

Louse typhus is, however, a very serious problem in many African States. There were approximately 1,000 deaths in the Union of South Africa during the year ending June 1935. Preventive measures being adopted consist of various methods of delousing blankets, clothing and the people themselves. It was agreed that no real progress against the spread of typhus can be made without greatly improving the economic status of the native in the States affected.

ii. The three types of typhus fever met with in South Africa, tick bite fever, rat flea typhus and louse typhus, are fully described on the lines of the work of PIPPER and DAU already summarized in this *Bulletin* [1935, Vol. 32, pp. 154, 561]. Tables are given showing the incidence of louse-borne typhus in the Union of South Africa; from 1923 to 1933, 34,986 cases were reported in this period and as is pointed out probably a large number of the milder cases were never reported at all.

iii. An account of an outbreak of louse-borne typhus in the Kigezi district of Uganda.

In 1932 there were 150 cases with 10 deaths

„ 1933	„	128	„	20	„
„ 1934	„	103	„	6	„

These natives are clothed in goat skins with the hair left on, the skins could not be disinfected by steam as this method destroyed the skins but a method of disinfestation by means of dry heat was devised and has proved a great success.

The skins are spread over a wicker basket and dried cow dung is burned underneath, the skins could be left on the frame for many hours without damage and lice and eggs were killed in less than half an hour. [See *Bull. of Hyg.*, 1935, Vol. 10, p. 629, where an illustration of the apparatus is given.]

D. Harvey.

BULLETIN DE L'ACADÉMIE DE MÉDECINE DE ROUMANIE. Paris. 1936. Vol. 1. No. 3. pp. 569-575. With 1 graph.—Rapport de la commission, nommée par l'Académie de Médecine, sur le plan de lutte contre le typhus exanthématique. [Prevention of Exanthematic Typhus. Report of the Rumanian Academy of Medicine.]

The first part of this report is historical and deals with the huge epidemics of typhus which devastated Serbia, Galicia and Rumania during the European War 1914-18.

Although typhus has now disappeared from Western Europe, it still smoulders on in Rumania, Russia, and Bessarabia and from these endemic centres epidemics break out every year in the winter time. The methods recommended by the Commission for combating these epidemics are similar to those evolved during the war. Diagnosis, notification, isolation and disinfestation of cases. Establishment of disinfestation stations in towns and villages and also scientific laboratories for the study of the disease. *D. H.*

PINKERTON (Henry). Criteria for the Accurate Classification of the Rickettsial Diseases (Rickettsioses) and of their Etiological Agents.—*Parasitology*. 1936. Mar. Vol. 28. No. 2. pp. 172–189. With 10 figs. on 2 plates. [27 refs.]

In recent years acute febrile diseases of man in nearly all parts of the world have been recognized as belonging to the rickettsia group. The occurrence of mild and atypical forms appears to be an outstanding characteristic of this group of diseases and this makes their differential diagnoses a difficult matter. The author deprecates the tendency to assign a local or personal name to organisms seen in incompletely studied strains, since this has often led to distinction without differences and to the accumulation of invalid terms in the literature. He considers that it is possible to classify accurately these diseases if complete morphological, histopathological and immunological studies are made and the object of the paper under review is to define and tabulate the criteria on which such an accurate classification may be based.

Criteria for Classification.

1. *Cross immunity tests.*—For practical purposes this is perhaps the most important single criterion, if correctly carried out and interpreted.

2. Study of smear preparations from the scrotal sac exudate of guineapigs and rats. Points to be observed are: (a) pattern of cell infection; (b) type of cell invaded; (c) morphology of organism.

In typhus, for example, the cells are packed with organisms and the scrotal cells only are invaded.

In spotted fever the organisms are scanty and both serosal cells and macrophages are invaded; the organism in spotted fever is larger than that in typhus and is more lanceolate and diplococcoid in shape and form; a halo may also be observed.

3. *Histopathology.*—For these examinations the most suitable material for examination from the guineapig is obtained from the scrotum, scrotal sac, epididymis and testis.

"Typhus nodes" may be found in material obtained from guineapigs infected with typhus and also in those infected with mild "spotted fever" but the characteristic lesion in spotted fever is the formation of acute fibrin thrombi in arterioles and venules. These thrombi contain polymorphs and may occlude the lumen of the vessel; the term thrombonecrosis is applied to this condition which has never been observed in animals or man infected with typhus.

4. *Location and morphology of organisms in sections.*—In typhus the mesothelial cells lining the tunica are packed with organisms but none are seen in macrophage cells nor are the smooth muscle cells invaded. In spotted fever mesothelial cells and also macrophages contain organisms but only scanty in number and the organisms are also present in the smooth muscle cells, a diagnostic point already described in 1919 by WOLBACH.

5. *Study of organism in tissue culture.*—In typhus the cells are packed with organisms but all are in the cytoplasm, none in the nucleus. In spotted fever the organisms are scanty in the plasma but the nuclei of the cell are invaded and may be packed with organisms which are mostly of the coccoid form.

In tissue culture the differences of morphology already noted in smear preparations are again noticeable in tissue cultures of the organism.

6. *Study of organism in the arthropod vector.*—In typhus the organism is found only in the cells lining the gut and is not passed hereditarily either in the louse or the flea, whereas in the tick in spotted fever all the tissues are invaded and the organism is passed hereditarily.

7. *Weil-Felix reaction.*—Useful but not decisive in differentiating mild cases of typhus from mild cases of "spotted fever."

8. *Clinical picture in the guineapig.*—The scrotal reaction in guineapigs infected with spotted fever may go on to gangrene and can be produced by subcutaneous injection of virus; this does not occur in typhus. There is usually a high mortality in spotted fever guineapigs. Guineapigs do not die from typhus infection.

9. *Clinical picture in man.*—May be of use in severe cases but is of little use in a district where mild cases of spotted fever are occurring along with cases of endemic typhus.

The actual viruses studied by the author were as follows :—

- Typhus—European epidemic strain (Wolbach)
- European epidemic strain (Breinl)
- Mexican endemic strain (Mooser)
- North Carolina endemic strain (Maxcy)
- Spotted fever—Rocky Mountain strain (Parker)
- Eastern strain (Badger)
- Minnesota strain (Reimann)

The paper is directly concerned with the differentiation of typhus and spotted fever although of course the criteria described would serve for the investigation and classification of any of the rickettsial diseases transmissible to laboratory animals.

The following is from the summary and conclusions of the author :—

"Morphological, histopathological, and immunological studies of seven strains of rickettsial disease have placed them in two widely separated groups, for which typhus and spotted fever seem the most logical names.

"Diseases of the spotted fever group are carried by ticks (*Arachnoidea*) and characterised by distinctive histopathological lesions—thrombonecrosis of arterioles and venules, with micro-organisms of definite and characteristic morphology, invading smooth muscle cells, as well as endothelium, mesothelium, and macrophages. Tissue culture studies show massive invasion and distention of cell nuclei, while cytoplasmic invasion of host cells is relatively sparse.

"Diseases of the typhus group are carried by lice and fleas (*Insecta*) and characterised by the facts that the intracellular parasite which causes them invades only endothelium and mesothelium, distends the cytoplasm of its host cells without ever invading nuclei, and in guinea pigs causes only proliferative endangitis without thrombonecrosis.

"In the spotted fever tick, organisms are intranuclear as well as intracytoplasmic, invade nearly all types of tissue, and are transmitted hereditarily. In typhus-infected lice and fleas, organisms are intracytoplasmic only, infect only the lining cells of the gut, and are not transmitted hereditarily."

The author considers that "The morphological, histopathological, and immunological differences between typhus and spotted fever are so great that these two diseases, as well as their causative organisms, should be widely separated from one another, and given definitely distinguishing names.

"It is suggested that the well-established name, *Rickettsia prowazeki*, be applied to intracytoplasmic micro-organisms in Insecta causing all diseases of the typhus group, and that *Dermacentroxenus rickettsi* (the name originally given by Wolbach) be applied to hereditarily transmitted micro-organisms invading nuclei in Arachnoidea and in tissue cultures, causing all diseases of the spotted fever group. Specific varieties, when established by the demonstration of definite and constant biological differences, should be indicated by variety names, as *Rickettsia prowazeki mooseri* (for endemic flea-borne typhus in all parts of the world). D. H.

BOYD (J. S. K.). **Classification of Typhus Fevers.** [Correspondence.]
—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. June 30. Vol. 30.
No. 1. pp. 131–133.

At the recent discussion on typhus fever at the Royal Society of Tropical Medicine references were made to a paper by BOYD [see this *Bulletin*, 1936, Vol. 33, p. 417]. As he points out in this letter the table in that paper was not intended to be a "suggested classification" but was an analysis according to serological findings of cases of typhus fever in India. This analysis allowed the cases to be placed in three sub-groups.

1. XK type=main agglutinin corresponding to Japanese River fever.
2. X19 X2 type=group agglutinins corresponding to Rocky Mountain fever and boutonneuse fever.
3. X19 type=main agglutinin corresponding to endemic or murine typhus. D. H.

COVELL (G.) & MEHTA (D. R.). **Studies on Typhus in the Simla Hills. Part IV. The rôle of the Rat Flea in the Transmission of Typhus.**
—*Indian J. Med. Res.* 1936. Apr. Vol. 23. No. 4. pp. 921–927. With 1 chart. [15 refs.]

A hundred and twenty-one *Xenopsylla cheopis* were collected from wild rats caught in Sabathu in the neighbourhood of Kasauli where cases of typhus had recently occurred. These fleas were emulsified and injected intraperitoneally into a guineapig which developed fever and orchitis. This strain of virus has now been passaged for 17 generations; out of 50 animals inoculated 38 developed orchitis and *Rickettsia* were readily demonstrated in smears from the scrotum. White rats which were inoculated with emulsion of brain from infected guineapigs developed agglutinins for *Proteus OX19* in two instances up to a dilution of 1/1,000, no reaction was obtained with *OXK* or *OX2*. The reactions of laboratory animals to this strain of virus isolated from fleas were the same as were obtained with the virus previously isolated from wild rats captured in the same villages; cross immunity tests were also positive.

Forty-six *X. cheopis* fleas were fed on a white rat which had been infected with the wild rat virus, these fleas were fed for three days on a second rat but without result, but later on the survivors of the same fleas were fed for nine days on a third white rat and this animal became

infected and guineapigs were infected from it. These animals developed fever and orchitis and Rickettsia were demonstrated; also cross immunity experiments with this flea strain and the original strain were positive. Some of the fleas which were infected by feeding on this rat were taken and examined and the cells of the midgut were found to be crammed with Rickettsial bodies. No Rickettsia could be found in laboratory bred fleas. The author points out that he has now isolated a virus from the wild rats in Kasauli and also from fleas caught on wild rats; he also shows that the time of maximum prevalence of fleas coincides with the season when the greatest number of typhus cases occur.

[A point requiring explanation is why this virus isolated from rats and fleas produces agglutinins for *OX19* only, as do similar viruses elsewhere, whereas the serum of the cases agglutinates *OXK*.] *D. H.*

MERCIER (H.), FABRE & SOULAGE. Sur un cas de fièvre typho-exanthématique d'origine vraisemblablement murine observé à Marseille. [**Case of Exanthematic Typhus, probably of Murine Origin, in Marseilles.**—*Marseille-Méd.* 1936. Mar. 15. Vol. 73. No. 8. pp. 339-344. With 1 chart.

Many cases of boutonneuse fever have been reported in Marseilles but so far no cases of endemic typhus have been, although such have been reported from other Mediterranean seaports:—

The patient was a soldier and was admitted to hospital from camp; the fever was severe, typhoid state, profuse rash on body, hands and feet, but sparing the face; Weil-Felix reaction positive 1/300 at beginning of second week of fever and epididymitis on the 21st day of fever. The man was a storekeeper and his work brought him into contact with rats. Experimental proof of the exact nature of the virus was not possible. *D. H.*

OLMER (D.), OLMER (J.) & AUDIER (M.). Les phlébites de la fièvre boutonneuse. [**Phlebitis in Boutonneuse Fever.**—*Bull. Soc. Path. Exot.* 1936. May 13. Vol. 29. No. 5. pp. 457-459.

Although the authors have seen many cases of boutonneuse fever they have so far seen phlebitis only in two cases. In one of these cases the initial sore, or tache noire, was just over the right femoral veins and the phlebitis occurred in this region. It is suggested that the phlebitis in typhus fever may be due to the Proteus organism and not to the virus itself. *D. H.*

COVELL (G.). **Studies on Typhus in the Simla Hills. Part V. Attempts to establish Strains of Typhus from Human Sources.**—*Indian Jl. Med. Res.* 1936. July. Vol. 24. No. 1. pp. 139-147. [13 refs.]

In a previous paper the author has recorded the isolation of strains of typhus virus from wild rats and rat fleas in Kasauli, Punjab. The rat strain has now been passaged for 35 generations and the strain from rat fleas for 31 generations; rabbits and white rats inoculated with these strains gave a positive Weil-Felix reaction for *OX19* and negative for *OXK* and *OX2*.

The present paper deals with the isolation of typhus virus from human cases; only a few cases of typhus occurred during the year and

of these only four were admitted to hospitals. Blood from three of these cases was inoculated into guineapigs; in all the three patients the Weil-Felix reaction was positive for *OXK* but negative for *OX19*. In the first case the blood was taken on the 11th day of the fever and in the second case on the 9th day. Two guineapigs were inoculated intraperitoneally and both developed fever, the virus was passaged for four generations and was then lost. One of the guineapigs was killed during the fever and the brain examined; definite typhus lesions were detected around the small blood vessels. None of the guineapigs developed orchitis and *Rickettsia* could not be found in smears from the tunica.

In Case 3 the blood was taken on the 10th day of fever and inoculated into a guineapig; fever developed on the 8th day and the virus was passaged for seven generations and then lost; scrotal reaction (slight) was noted on one occasion. Emulsion of the spleen of an infected guineapig (passage virus) was inoculated into the anterior chamber of the eye of a rabbit. An iridocyclitis resulted and this virus was successfully passaged in the eyes of rabbits for four generations and then lost; but *Rickettsia* could not be found in Descemet's membrane.

Monkeys inoculated with the virus showed little or no signs of illness, but one gave a positive Weil-Felix reaction for *OXK*. Of 29 rabbits inoculated 6 gave positive reactions for *OXK* and all were negative for *OX19*; in the positive reactors there was a rising and a falling titre of agglutination.

It will be noted that there was a marked contrast between the action of these viruses obtained from the human cases and the rat virus previously isolated; the latter caused a severe and prolonged fever in guineapigs with scrotal reaction, and numerous *Rickettsia* could be readily found in smears from the tunica; also the sera of rats and rabbits yielded a marked positive reaction for *OX19*. On the other hand the virus from cases of typhus caused only slight fever in guineapigs without any scrotal reaction and *Rickettsia* could not be definitely identified in smear preparations; this virus could not be established in laboratory animals and the Weil-Felix reaction was positive only in low dilutions and for *OXK*, not for *OX19*.
D. H.

LEWTHWAITE (R.) & SAVOOR (S. R.). **Recent Work on the Typhus-like Fevers of Malaya.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. Apr. 8. Vol. 29. No. 6. pp. 561–571. [16 refs.]

This paper read before the Royal Society of Tropical Medicine and Hygiene gives an account of some of the work carried out by the authors in Malaya on the typhus group of fevers, rural typhus, tsutsugamushi fever and urban typhus; most of this work has already been published and has been reviewed in the *Bulletin*.

The principal results obtained are grouped under five headings:—(1) Demonstration of the rickettsial nature of the viruses of all three members of the tropical typhus group in Malaya; (2) The relationship of the three diseases to each other and to Rocky Mountain fever; (3) Search for the carriers of rural typhus and urban typhus; (4) Evidence as to the reservoir of the viruses; (5) Attempted inoculation of guineapigs against experimental infection with rural typhus.

The findings are as follows:—

1. *Rickettsia* could be demonstrated in all three diseases; in rural typhus and in tsutsugamushi fever they were seen in the cells of

Descemet's membrane in the eye and resembled in morphology *R. orientalis* of Japanese workers. Rickettsia seen in smear preparations from the tunica of guineapigs infected with urban typhus on the other hand resembled *R. prowazeki*.

2. Complete cross immunity exists between rural typhus and tsutsugamushi fever in Malaya ; and the viruses of these two diseases when injected intradermally in rabbits and monkeys produce a primary sore. There is no cross immunity between the viruses of urban and rural typhus or between rural typhus and Rocky Mountain fever.

3. Urban typhus in Malaya, as elsewhere, is carried by the rat flea ; but the rat flea is not the vector of rural typhus although it can be infected experimentally. Two species of tick, *Dermacentor andersoni* and *Rhipicephalus sanguineus*, were experimented with but no evidence could be obtained that either species of tick could transmit or even acquire the virus of rural or urban typhus.

4. Experiments have shown that the wild rat is a reservoir of the virus of rural typhus ; two strains of this virus were isolated from rats and when inoculated into rabbits produced agglutinins for OXK, and produced fever and ascites in guineapigs.

5. All attempts to protect guineapigs, by vaccination with formalized brain tissue of animals infected with the virus of rural typhus, failed.

In the discussion which followed, Dr. FELIX pointed out that killed virus from the arthropod vector is superior to killed virus from mammalian tissue for immunization. Dr. FLETCHER is convinced that few if any cases of typhus occurred in Malaya before 1924. Colonel SHORTT referred to recent work by COVELL and himself in Kasauli ; his opinion is also that typhus is a new disease in that locality. Dr. LÉPINE compared conditions in Indo-China with those met with in Malaya. He agreed that rural typhus and tsutsugamushi fever are probably one and the same disease.

D. H.

LÉPINE (P.) & LORANDO (N.). Etude d'un foyer de typhus endémique d'origine murine. [**Endemic Typhus associated with Rats in Athens.**—*Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 285-295. With 4 figs. [10 refs.]

Endemic typhus was first reported in Athens in 1931, and since then in one small area in the city and in the same houses in that area cases have been reported every winter, whereas in other parts of the city only a few isolated cases have been discovered. This particular section of the city is a "slum area" consisting of small dilapidated houses built over the ruins of the ancient city. These sites are being gradually excavated by antiquarians and as the houses are removed the people that lived in these houses are concentrated more and more in the remaining houses and with them is concentrated the rat population ; these rats find plentiful harbourage in the underground wells, pits and cellars of the ancient historical ruins. A notable increase of rats in some of the houses was observed after the destruction of a military bakery which had been accommodated in a disused Turkish mosque.

It is undoubtedly this aggregation of people and rats which has caused the outbreaks of typhus fever each cold season. In one group of refugees living in this area in very crowded conditions in tumble-down rat infested huts no cases of typhus occurred among the adults but several cases were met with in the children. On enquiry it was

found that in Asia Minor, where these people had come from, the older people had suffered from typhus and were immune ; the children born since arrival in Athens contracted fever. The cases were typical of endemic typhus and the Weil-Felix reaction *OX19* was positive up to a dilution of 1/4,000 ; strains of murine virus were isolated by injection of the blood of the patients into the spermophile (*Citellus*), an animal which the authors find to be more susceptible than the guineapig, and the virus remains viable in the brain for long periods.

The strains of virus isolated from the rats and from the cases of fever were proved to be identical. Although many mice were captured in the buildings none was found to be infected. *D. H.*

VAUCCEL (M.). Recherche du typhus murin au Tonkin. [**Research on Murine Typhus at Tonking.**]*—Bull. Soc. Méd. Chirurg. Indochine.* 1936. Feb. Vol. 14. No. 2. pp. 251–280. With 16 charts.
— Recherche du typhus murin au Tonkin.—*Bull. Soc. Path. Exot.* 1936. May 13. Vol. 29. No. 5. pp. 542–550.

A hundred and thirteen rats captured in Hanoi in 1934 were examined and all were negative. In 1933, 154 rats were examined and from the brains of these animals nine viruses were isolated ; on further examination of these nine only one gave definite tests for typhus, *i.e.*, fever, scrotal reaction in guineapigs and cross immunity with a known typhus virus. A typhus virus was also obtained from the brains of rats captured in other areas in Tonking. The author points out that the local murine virus does not give so constant or definite scrotal reactions in male guineapigs as do viruses described in other countries and, owing to the slight fever produced and difficulty of establishing the virus, cross immunity test could not be satisfactorily completed. *D. H.*

TOULLEC (F.) & RIOU (M.). Quelques cas de typhus endémique contractés au Tonkin. [**Endemic Typhus contracted in Tonking.**]*—Bull. Soc. Méd.-Chirurg. Indochine.* 1936. Feb. Vol. 14. No. 2. pp. 288–299.

Seven cases of typhus are described in detail ; in one case *Bact. typhosum* was isolated by blood culture but the Widal reaction was negative and the Weil-Felix reaction was positive up to 1/1,000. In the other six cases the Weil-Felix reaction was also positive. A rash was seen in two only of the cases and in these was mild and transient. The only constant symptom in all the cases was a very definite fever which lasted from 2 to 3 weeks. Blood was taken from one of the cases and injected into guineapigs but without result. *D. H.*

MASSIAS (Charles). Typhus tropical bénin. Typhus endémique en Cochinchine. [**Benign Tropical Typhus in Cochinchina.**]*—Rev. Méd. et Hyg. Trop.* 1936. Jan.-Feb. Vol. 28. No. 1. pp. 38–43. [19 refs.]

This paper gives an account of cases of typhus previously described in Indo-China and Cochinchina ; in the present paper a mild case of fever is reported which occurred in the Cochinchina delta. There was no rash, no eruption and no primary sore, but the serum of the patient agglutinated *OXK* up to a dilution of 1/100. *D. H.*

MONTEL (R.). Cas de pseudo-typhus type Schüffner observés en Cochinchine, fièvre boutonneuse ? Fièvre fluviale du Japon ? [**Pseudo-Typhus of Schüffner Type in Cochinchina. Boutonneuse Fever ? Japanese River Fever ?**].—*Bull. Soc. Path. Exot.* 1936. May 13. Vol. 29. No. 5. pp. 551-559.

Five cases are described.

No history of bite of tick in any ; infection was possibly due to mites. A primary ulcer was noted in 2 only out of 5 but swollen glands in all. Incubation period 5 days. Clinically the cases resembled boutonneuse fever ; but as LÉPINE pointed out in the discussion there is no cross immunity between boutonneuse fever virus and Japanese River fever virus. D. H.

VAN WAARDENBURG (D. A.). Over vier gevallen van Rickettsiose in de residentie Benkoelen. [**Four Cases of Rickettsia Infection in Benkoelen Residency.**].—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1936. Mar. 24. Vol. 76. No. 12. pp. 712-721.

Clinical details of four patients are briefly stated and more fully the results of their blood examination and serological tests. The first was a European, 39 years old ; his serum reacted with *Proteus X19* in a dilution of 1 : 100 on the 7th day of illness, 1 : 800 on the 20th. The second was a Javanese, 30 years ; he gave agglutination of *Proteus X19* 1 : 50 on the 12th day, 1 : 800 on the 19th. The third, also a Javanese, aged about 50 years, gave a negative with *Proteus X19* but a positive 1 : 100 with the Kingsbury strain [day of illness not known for certain, he had felt ill for "several days"] and a week later 1 : 800 against the same strain. The last, a Batakian, reacted with *Proteus X19*, 1 : 100 on the 20th day and 1 : 800 on the 27th. Thus three were infected with shop-typhus and one with scrub-typhus ; it is worthy of note that two of the three were out-door workers. H. H. S.

TOULLEC (F.) & RIOU (M.). Le typhus murin. [**Murine Typhus.**].—*Bull. Soc. Méd.-Chirurg. Indochine.* 1936. Feb. Vol. 14. No. 2. pp. 281-287.

A general discussion of endemic typhus with reference to the virus, the carrier, the reservoir, diagnosis, clinical course in man with therapeutic treatment. D. H.

i. **HUGHES (J. C.), DIETHELM (O. A.) & TEBBUTT (A. H.).** **Australian Typhus, with a Report of a Fatal Case.**—*Med. Jl. Australia.* 1936. Mar. 7. 23rd Year. Vol. 1. No. 10. pp. 327-329.

ii. **TEBBUTT (A. H.) & WARDEN (D. A.).** **Australian Typhus : a Case with Recovery.**—*Ibid.* pp. 330-331. With 1 chart.

i. The first case of endemic typhus was notified in N. South Wales in 1927 ; since that year 27 cases have occurred in the northern districts of the State and in Sydney. Three cases are reported which occurred among people who worked in a rat infested warehouse ; two of these cases gave a positive Weil-Felix reaction and one case was fatal ; at post-mortem haemorrhagic consolidation of the lung (infarction ?) was noted with enlargement of the spleen. [See paper by MATHEW below].

ii. The author reports a case of fever with rigor, macular rash and drowsiness, no enlargement of spleen ; the patient was a woman living

in a good locality but the house next door had been recently pulled down and rats had invaded her house.

Blood culture was sterile and the Widal reaction negative ; on the 11th day the Weil-Felix reaction was positive in a dilution of 1/160 for *OX19* but was negative for *OXX*.
D. H.

MATHEW (R. Y.). **Notes on a Fatal Case of Endemic Typhus.**—*Health. Canberra.* 1936. Mar. Vol. 14. No. 3. pp. 24–26.

In this case the incubation period could be definitely fixed at 13 days, fever was high and a macular rash was noted, the patient developed the typhoid state and died on the 12th day. The Weil-Felix reaction, negative at first, became positive later but only in a dilution of 1/80 for *OXX*. At the post-mortem a haemorrhagic consolidation of one lung was found with enlargement of the spleen ; a similar condition has already been noted in fatal cases of Australian typhus. Three guinea-pigs were inoculated with emulsion of the brain of this case ; one of these developed fever which lasted for 8 days with loss of weight and scrotal swelling ; diplococcal bodies were found in the scrotal fluid.

D. H.

DURIEUX (C.). Présence à Dakar d'un virus typhique murin. [**Murine Typhus Virus in Dakar.**]—*Bull. Soc. Path. Exot.* 1936. Mar. 11. Vol. 29. No. 3. pp. 228–230.

In the port of Dakar, which is connected by rail with Casablanca where cases of typhus have been reported, rats were captured during the summer of 1935 ; 47 of these were killed and emulsions of brain in batches of 7 were inoculated into guinea-pigs. A virus was isolated which produced fever and scrotal swelling in all guinea-pigs in which it was passaged. This virus was tested against the virus previously isolated in Casablanca and complete cross immunity was demonstrated. Four cases of fever were reported and the sera of these people were tested during convalescence ; all gave a high positive Weil-Felix reaction.
D. H.

VAN SLYPE (W.) & BOUVIER (G.). Sur l'existence de la fièvre bouton-neuse dans les régions de Luputa et de Port-Franqui. [**Bouton-neuse Fever in the Luputa and Port-Franqui Districts of Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1936. Mar. 31. Vol. 16. No. 1. pp. 143–148.

In 1933 a case of suspected bouton-neuse fever was reported in this district of the Belgian Congo. It was therefore decided to carry out an investigation on the following lines :—(1) inoculation of dog ticks into guinea-pigs ; (2) study of the Weil-Felix reaction in local dogs. Seventy-five ticks were collected, emulsified and injected into guinea-pigs with negative results. The sera of 100 dogs tested were also negative.
D. H.

MOREIRA (João Affonso) & DE MAGALHÃES (Octavio). Typho exanthematico de Minas Geraes. [**Typhus in Minas Geraes.**]—*Brasil-Medico.* 1936. Aug. 22. Vol. 50. No. 34. pp. 727–731. With 5 charts.

In previous communications [see this *Bulletin*, 1935, Vol. 32, p. 157 ; 1936, Vol. 33, p. 40] the authors dealt with certain aspects of typhus in

Minas Geraes and described experimental work in connexion therewith. It seemed unlikely that all cases should be severe, that is, there was great probability that mild cases were occurring but escaped observation. Examination of suspects was therefore undertaken in three directions: (1) To test the protective power of serum of patients, whether febrile or not; (2) To test the Weil-Felix reaction; (3) To observe the results of inoculation of guineapigs with the isolated virus. The second of these has proved of high diagnostic value in Minas Geraes. Details of one series are given, those examined being members of the household of a man who had died of the disease, *viz.*, the mother, 3 brothers, and a sister of the deceased, and the husband of the last. All gave a positive Weil-Felix, 1/40–1/100, except the husband (1/20) with *OXX* and *HXX*, the other two tests giving negative results.

H. H. S.

- i. PLOTZ (Harry) & GIROUD (Paul). Culture des rickettsies du typhus exanthématique. [**Cultivation of Rickettsia of Exanthematic Typhus.**]—*C. R. Soc. Biol.* 1936. Vol. 122. No. 23. pp. 863–864.
- ii. — & —. Culture des rickettsies de la fièvre boutonneuse. [**Cultivation of Rickettsia of Boutonneuse Fever.**]—*Ibid.* pp. 864–865.

i. The method adopted was that of Nigg and Landsteiner. Small portions of the tunica of normal guineapigs were placed in normal guineapig serum 1 part+Tyrode's solution 2 parts, 10 to 20 pieces of tissue in 3 cc. of the fluid in 25 cc. flasks. As Plotz has already shown it is necessary to exclude air from the flasks by means of rubber bungs or caps as when serum is used; if air is admitted CO_2 is lost and the medium becomes alkaline. The flasks are incubated at 37°C. for 10 days and the inoculum is small pieces of the testicle of infected guineapigs. Rickettsia were seen in films made from the cultures and guineapigs were infected by small doses of the cultures; these animals were immune when tested later. True typhus virus was subcultured 26 times and a murine virus 22 times.

ii. This virus was isolated in 1934 from a case of boutonneuse fever and has been passaged in guineapigs since then. Two strains of this virus have been cultivated by the method described in the previous paper, one has been successfully subcultured 7 times and the other 5 times. Rickettsia were seen in cells in the cultures and also in groups outside of the cells. Inoculation of 1 cc. and 0.5 cc. of the cultures produced fever in guineapigs and even 1/1,000 cc. of culture fluid produced fever, but after a prolonged incubation period. These animals were afterwards proved to be immune. Inoculation of culture into rabbits produced a positive Weil-Felix reaction.

D. H.

- NIGG (Clara). **Studies on Culture Strains of European and Murine Typhus.**—*Jl. Experim. Med.* 1936. Mar. 1. Vol. 63. No. 3. pp. 341–351.

The cultures used in these experiments were made in tunica-serum-Tyrode medium as described in previous papers by the same author. The usual inoculum was from an emulsion of the tunica of guineapigs infected with European or murine virus. The actual viruses were a European virus (Breinl) which had been cultured through 36 generations

over a period of 1½ years in the laboratory, a murine typhus virus which had been cultured through 82 generations during a period of 4 years.

It was noted that when observed over a long period the numbers of *Rickettsia* present in cultures of the two series were approximately equal, and when inoculated into guineapigs from time to time little or no variation in virulence was noted in either strain. It was also noted that when employing cultures of the European virus for inoculation of guineapigs scrotal reaction was more common than when brain from passage animals was employed, due probably to the greater numbers of *Rickettsia* in the culture material, but after the 19th generation culture the scrotal reaction was not greater than usual. The evidence of these culture experiments indicated that the murine strain of typhus virus has a definite predilection for tunica tissue and that the reaction is due to this property rather than to the numbers of *Rickettsia* injected; thus small doses of emulsion of brain of guineapigs infected with the murine strain produced marked scrotal reactions, whereas large doses of brain of guineapigs infected with European virus produced little or no reaction.

D. H.

GNUTENKO (M.) & FRÜAOF (V.). La cultivation du virus du typhus exanthématique épidémique en association avec des Sarcines. [Cultivation of the Virus of Epidemic Typhus in association with *Sarcinae*.]—*Rev. Microbiol., Épidémiol et Parasit.* 1935. Vol. 14. No. 4. [In Russian pp. 325–337. With 5 charts. [28 refs.] French summary pp. 337–338.]

Emulsion of brain of a guineapig infected with typhus virus was inoculated into tubes of broth containing yeast cells and these tubes were incubated; a Gram-negative bacillus was isolated from one of these cultures morphologically resembling a *proteus* bacillus. This bacillus was agglutinated by the serum of typhus cases to the same degree as was the laboratory strain of *Proteus X19*. The serum of rabbits, which had been inoculated with this bacillus, agglutinated the homologous bacillus and the laboratory strains of *Proteus* to the same dilutions.

D. H.

BALTAZARD (M.). Multiplication des virus exanthématiques dans les tissus. [Multiplication of Typhus Virus in the Tissues.]—*Bull. Soc. Path. Exot.* 1936. Apr. 1. Vol. 29. No. 4. pp. 403–411. With 2 figs.

Boutonneuse fever.—Intradermal injection of the virus of bouton-neuse fever in guineapigs produces an inflammatory reaction and definite multiplication of the virus at the site of injection; the virus is present in the lesion from the 2nd to the 7th day. Histological examination shows that at first lymphocytes, plasmocytes and polynuclear cells are present but later on definite nodules consisting of groups of histiocytes can be seen around the blood vessels and *Rickettsia* can be seen in the cells; later still necrosis occurs.

Virus of murine typhus.—Similar results are obtained with this virus; a "tache noire" is produced by intradermal injection. The virus of Rocky Mountain fever did not produce any local reaction nor could the virus be recovered from the site of injection; the same is true of the virus of true epidemic typhus.

D. H.

- i. BRIGHAM (George D.). **A Strain of Endemic Typhus Fever Isolated from the Brain of a Wild Rat.**—*Public Health Rep.* 1936. Mar. 27. Vol. 51. No. 13. pp. 337-339.
- ii. ——. **Susceptibility of the Opossum (*Didelphis virginiana*) to the Virus of Endemic Typhus Fever.**—*Ibid.* pp. 333-337. With 4 figs.

i. A case of typhus was discovered in a small grocery store in Alabama which was rat-infested. Rats (*R. norvegicus*) were captured and killed and fleas (*X. cheopis*) removed. The fleas were emulsified and injected into guineapigs without any result. Emulsion of the brains of the rats was injected into guineapigs and fever resulted with swelling of the scrotum. This virus was passaged for 3 generations and was also injected into rabbits; the Weil-Felix reaction became positive. Rickettsia were found in smears from the tunica of guineapigs, and typical typhus lesions were demonstrated in the brain.

Cross immunity tests were positive with a local strain of endemic typhus virus and with a strain of European epidemic typhus (Breinl).

ii. A strain of the virus of endemic typhus obtained from local cases was utilized and an opossum was inoculated intraperitoneally with testicular washings from an infected guineapig. There was no fever and no symptoms and the animal was killed on the 10th day after the inoculation (no p.m. sign); emulsion of the brain was injected into guineapigs and fever and scrotal reaction resulted. Cross immunity tests with this virus and the local virus were positive, and the brains of infected guineapigs showed typical typhus lesions. The serum of rabbits inoculated with the opossum virus gave a positive Weil-Felix reaction.

D. H.

MASAYAMA (Suguru). Experimentelle Untersuchung ueber die Ansteckung von Flecktyphus durch die Nasenhohle und den Verbreitungsweg desselben im Koerperinneren. [**Experimental Research on Infection with Typhus through the Nasal Cavity and its Mode of Spread to Internal Organs.**]—*Jl. Oriental Med.* 1936. June. Vol. 24. No. 6. [In Japanese pp. 1193-1216. With 1 plate, 3 charts & 1 fig. [15 refs.] German summary pp. 87-89.]

The author finds that the virus of typhus can pass through the normal mucous membrane of the nose in guineapigs; investigation of the infected animals showed that the virus could be recovered from the lymph glands draining this area and from other glands and also from the brain and spleen. The presence of the virus in these organs was demonstrated by inoculation of emulsions into the testicle of normal guineapigs.

D. H.

BLANC (Georges) & BALTAZARD (Marcel). Longévité du virus du typhus murin chez la puce (*Xenopsylla cheopis*). [**Longevity of the Murine Typhus Virus in the Flea (*X. cheopis*).**]—*C. R. Acad. Sci.* 1936. Apr. 27. Vol. 202. No. 17. pp. 1461-1463.

Laboratory bred fleas (*X. cheopis*) were fed on infected rats, then removed and placed in glass bottles; clean rats were placed in the bottles

and left for 48 hours and then removed and the fleas were returned to the bottle, the fleas were changed to a clean bottle every 10 days. There were 48 hours between the feeds on rats. The rats were killed from time to time and emulsions of brain injected into guineapigs; also emulsion of the fleas was injected at intervals. It was found that fleas were still infective up to 100 days. The experiment started on 23rd December with 635 fleas and finished on 30th May with 35 fleas.

D. H.

BLANC (Georges) & BALTAZARD (Marcel). L'influence du jeûne sur le développement du virus du typhus murin chez la puce (*Xenopsylla cheopis*). [**Influence of Fasting on the Development of the Murine Typhus Virus in the Flea (*X. cheopis*).**—*C. R. Acad. Sci.* 1936. June 29. Vol. 202. No. 26. pp. 2191–2192.]

Fleas were fed on an infected rat for 24 hours, then starved for 12 days. They were then found to be non-infective; the fleas were again fed for 48 hours and became infective.

The authors consider that the ingested virus does not multiply until a second blood feed. [A similar phenomenon has been noted with ticks and Rocky Mountain fever virus.]

D. H.

- i. EPSTEIN (G. W.) & SILVERS (I. L.). **Transmission of Rat Virus to Guinea Pigs through Fleas. Second Preliminary Report.**—*Giorn. di Batteriol. e Immunol.* 1935. May. Vol. 14. No. 5. pp. 1079–1088. With 1 fig.
- ii. —, — & EXEMPLARSKAYA (E. V.). **Searching for Typhus Virus in Moscow Rats (Winter 1934). Third Report.**—*Ibid.* pp. 1089–1098.

i. Three hundred and seventy-one wild rats were captured in Moscow and 1,375 fleas collected from them, 3·7 fleas per rat. 1,081 fleas were utilized in the experiments and 82 per cent. of these were *X. cheopis*, 18 per cent. *Cer. fasciatus*. 412 fleas were fed on guineapigs and 245 were utilized to provide suspension of intestine for inoculation into 19 guineapigs; in some instances the fleas were first fed on the guineapig, then killed and the intestines removed and emulsified and inoculated. In 11 groups both methods were successful. Emulsions of the intestines of 10 to 30 fleas were utilized and groups of 8 to 35 fleas were fed on the guineapigs. In one instance an emulsion of only 10 intestines produced infection and 53 per cent. of the experiments gave positive results. All these successful results were obtained with *X. cheopis*; no success with *C. fasciatus*.

The rats from which the fleas were taken gave a positive Weil-Felix reaction and all the infected guineapigs had fever and scrotal swelling; Rickettsia were demonstrated in smears from the intestines of the fleas and from the tunica of infected guineapigs. One conclusion was that the virus is more concentrated in the flea intestine than in the rat brain.

ii. In the winter of 1934 the same experiments were repeated but without any success, many of the experimental animals died of pneumonia but there was no evidence of typhus infection. 237 rats and 842 fleas were employed.

D. H.

- i. BALTEANU (I.) & CONSTANTINESCO (N.). Réaction de Weil-Felix chez les rats sauvages de Roumanie. Présence d'un virus murin. [**Weil-Felix Reaction in Wild Rats of Rumania. Presence of a Murine Virus.**]—*C. R. Soc. Biol.* 1936. Vol. 121. No. 13. pp. 1427-1430.
- ii. — & —. Virus murin isolé à Jassy. Réceptivité des animaux de laboratoire. Sensibilité de l'homme. [**Murine Virus of Jassy. Receptivity of Laboratory Animals ; Sensitivity of Man.**]—*Ibid.* pp. 1430-1433.
- iii. — & —. Virus murin isolé à Jassy. Dispersion et persistance dans l'organisme ; voies d'élimination et voies d'infection. [**Murine Virus of Jassy. Dispersion and Persistence in the Organism, Routes of Elimination and of Infection.**]—*Ibid.* pp. 1434-1436.
- iv. — & —. Sur un virus murin de fièvre exanthématique isolé à Jassy (Roumanie). [**Murine Typhus Virus isolated at Jassy (Rumania).**]—*Bull. Acad. Méd. Roumanie.* Paris. 1936. Vol. 1. No. 3. pp. 518-539. With 5 figs.

i. One hundred and twenty-one rats were captured in the town of Jassy in Rumania and in villages in the neighbourhood where cases of endemic typhus had occurred. The blood of 104 of these rats was tested for the Weil-Felix reaction against emulsions of *OX19* and grouped according to the results.

Group	I	7 rats	1/200 to 1/600
	„	II 38 „	1/50 „ 1/100
	„	III 59 „	negative

43 per cent. of the rats examined gave a positive result.

The rats were killed and the brains emulsified and injected into guineapigs. Of the 121 examined 110 gave negative results.

Four strains of virus were isolated from groups of rats, only one of these strains was established in guineapigs, this particular strain, called "Dana," was isolated from a group of 4 rats captured in Jassy at a flour mill of that name. These rats were from Group I above in which the Weil-Felix reaction was positive in 1/200 to 1/600.

ii. In this paper the reactions of the strain of typhus virus in experimental animals are recorded.

In white rats this strain produced high fever and many of the infected animals died. In wild rats fever was produced and loss of weight occurred. In mice the strain produced a fatal illness—all the infected animals died. Both in white rats and wild rats and also in the dog the Weil-Felix reaction became positive. In the spermophile only an inapparent infection resulted but the brain was infective for guineapigs for long periods.

The virus was passaged in guineapigs for many generations; emulsion made of the brains of these animals in the first few generations when inoculated into men produced typical attacks of mild typhus but when the infective material was taken from guineapigs later in the series no fever was produced but the blood of the patient was infective for guineapigs. Material taken still later in the series produced neither fever nor any infection; the Weil-Felix reaction was positive in the human cases of fever.

iii. In guineapigs this strain of virus produced fever only, without any scrotal reaction, nor could *Rickettsia* be discovered in smears from

the tunica. The incubation period was usually about 3 days and fever lasted from 6 to 11 days; there was loss of weight and 50 per cent. of the animals died. Those that recovered from the infection were immune to further inoculations with the same virus, but so far as one can discover no cross immunity tests with known strains of typhus virus were attempted.

iv. The information contained in this is the same as that given in the three preceding papers. *D. H.*

BALTEANU (I.) & CONSTANTINESCO (N.). Sur la nature du virus murin de fièvre exanthématique isolé à Jassy. [**Nature of the Murine Typhus Virus isolated at Jassy.**—*C. R. Soc. Biol.* 1936. Vol. 122. No. 21. pp. 702-704.]

The reactions of this murine virus as regards its action on animals have already been described.

It was found that the virus could resist cold for 50 days and that up to 5 days bile had no effect on it. In 50 per cent. glycerine the virus was viable for 25 days but not after 60 days.

Filtrability.—Five times out of 9 trials the virus passed through a Seitz filter; it was partially retained by a Chamberlain L2 filter and completely retained by L3. *D. H.*

BLANC (Georges) & NOURY (M.). Sur un microbe du type *Proteus X19* isolé du sang d'un malade atteint de typhus murin. [**Bacillus of *Proteus X19* Type isolated from Blood of Man infected with Murine Typhus.**—*C. R. Soc. Biol.* 1936. Vol. 121. No. 15. pp. 1572-1573.]

A freely mobile non-Gram-staining bacillus was isolated from the blood of a case of endemic typhus. This bacillus did not ferment lactose or liquefy gelatine but produced acid in glucose and saccharose, and acid and gas in maltose, the indole test was positive. Both H and O varieties were isolated. The O type was agglutinated up to a dilution of 1/6,000 by the serum of the case of fever. *D. H.*

COSTANZI (Carlo). Note istologiche intorno a tre casi di "febbre eruttiva." —*Polichimico. Sez. Med.* 1936. Apr. 1. Vol. 43. No. 4. pp. 175-204. With 11 figs. [38 refs.]

LEWTHWAITE (R.) & SAVOOR (S. R.). **The Typhus Group of Diseases in Malaya. Part IV: the Isolation of Two Strains of Tropical Typhus from Wild Rats.**—*Brit. J. Experim. Path.* 1936. June. Vol. 17. No. 3. pp. 208-214.

It has already been shown by the authors and others that agglutinins for *OXX* and for *OX19* can be found in the sera of wild rats in Malaya.

The authors have succeeded in isolating a rural typhus virus from the local wild rat; this virus produced fever and scrotal swelling in guinea-pigs but only agglutinins for *OXX* in rabbits. The virus of rural typhus does not as a rule produce scrotal swelling in guinea-pigs and in this instance the authors consider that the symptom was caused by

secondary infection with the spirillum of rat-bite fever. The typical ocular reaction was obtained in rabbits, and rickettsia resembling *R. orientalis* could readily be demonstrated in the cells of Descemet's membrane. Of 42 rabbits inoculated with this virus (Rat 5) 27 gave a positive reaction, 18 of these gave a reaction with OXK and 8 with OX19, 1 gave reactions for both. Cross immunity was complete in rabbits against the viruses of rural typhus and tsutsugamushi fever derived from human cases.

D. H.

LEWTHWAITE (R.) & SAVOOR (S. R.). **The Typhus Group of Diseases in Malaya. Part V : The Weil-Felix Reaction in Laboratory Animals.**—*Brit. Jl. Experim. Path.* 1936. June. Vol. 17. No. 3. pp. 214-228. [12 refs.]

This highly technical paper is a report of the inoculation of rabbits and monkeys with the viruses of rural and urban typhus and the results of the Weil-Felix reaction. Both living and alcohol treated emulsions of *Proteus* were employed; the sera of 310 normal animals were first tested with the following results:—

With OXK 90 per cent. of the normal sera gave negative results and with OX19 99.4; as a result of these tests it was decided that with OXK a titre of 50 or over would be taken as positive whereas with OX19 a titre of 1/25 or over would be taken as positive. Blood was drawn from the test animals before inoculation and at intervals of 5 days from the 10th day onwards.

Rural typhus virus.—Of 27 rabbits inoculated intraperitoneally 18 gave positive results and all with OXK. Two rabbits inoculated intraocularly with the blood from two cases of rural typhus both gave positive Weil-Felix reactions with OXK. Of 24 rabbits inoculated intraocularly with passage virus 10 were positive all with OXK.

Virus of tsutsugamushi fever.—One rabbit inoculated intraperitoneally gave a positive (OXK). Of 6 rabbits inoculated intraocularly with the virus from cases of fever two gave a positive reaction, and of 57 inoculated by the same route with passage virus 34 gave a positive reaction with OXK.

Virus of urban typhus.—Of 8 rabbits inoculated intraperitoneally 4 gave a positive reaction with OX19 and of 55 inoculated intraocularly 30 gave a positive reaction all for OX19.

Two strains of rural typhus virus isolated from wild rats were also tested; these gave positive reactions in rabbits for OXK in the same proportion of the animals whatever route was employed. It was noted also that small doses of virus, say 0.1 cc., when inoculated into the eye of rabbits produced a much higher response than did larger doses, 6-10 cc., inoculated intraperitoneally. It was also noted that the ocular reaction in rabbits may be positive, and often is, though the Weil-Felix reaction is negative. Only 50 per cent. of rabbits inoculated give a positive with rural typhus virus, whereas with louse-borne typhus virus practically all give a positive reaction.

Monkeys—rural typhus virus.—One gibbon inoculated with the virus of rural typhus gave a positive reaction for OXK, 1/170, on the 21st day and a positive reaction for OX19 on the 15th day; this phenomenon is discussed later. Three *Macacus* monkeys all gave a positive reaction for OXK and negative for OX19.

Change of type of antibody response.—In one case of rural typhus fever the serum of the patient gave a positive reaction in rising and

falling titre both for *OX19* and for *OXK*, the *OX19* agglutinins appearing earlier ; on the 11th day of the fever the actual result was *OXK* 1/1,100 and *OX19* was 1/1,900 ; this virus when isolated in guineapigs gave the definite reactions of a true rural typhus virus, *i.e.*, no scrotal reaction, ascites and a 90 per cent. mortality in the animals and also gave the typical ocular reaction in rabbits with *R. orientalis* present in the cells. When inoculated into rabbits all reacted with *OXK*, but when inoculated into a gibbon the serum of this animal gave a positive reaction for both *OX19* and *OXK*, just as the serum of the original patient had done. This strain from the gibbon when inoculated into rabbits gave at first slight reactions for *OX19* and pronounced agglutinins for *OXK*, but later passages in rabbits only gave agglutinins for *OXK*.

There was definite cross immunity between this strain derived through the gibbon and the original human strain in guineapigs ; another gibbon immune to rural typhus gave no response when inoculated with this strain. Three monkeys inoculated gave agglutinins for *OXK* and none for *OX19*.
D. H.

PERGHER (G.). L'importance de la réaction de Weil-Félix dans la prophylaxie du typhus exanthématique. [*Value of the Weil-Felix Reaction in Typhus Prophylaxis.*]—*Ann. Soc. Belge de Méd. Trop.* 1936. Mar. 31. Vol. 16. No. 1. pp. 89-104. [26 refs.]

This paper is written in connexion with the recent epidemic of louse-borne typhus in the district of Urundi in the Belgian Congo.

It was found that it was not possible to diagnose cases of typhus from other fevers in natives on clinical grounds alone partly owing to the difficulty experienced in examining the natives and for other reasons ; for a diagnosis of typhus (which was essential before effective prophylaxis could be applied) it was necessary to rely on the results of the Weil-Felix reaction. A discussion on the nature of the Weil-Felix reaction and the relation between *Proteus* and *Rickettsia* follows ; and the fact that the Weil-Felix reaction is not positive in other diseases is emphasized. The sera of over 2,000 local natives, some of whom were healthy and some suffering from fevers, sleeping sickness, relapsing fever, leprosy, syphilis, etc., were tested for the Weil-Felix reaction and all were negative. This opinion has to be modified, for later in the paper it is stated that 13 per cent. of the 2,658 sera tested gave a positive reaction in a dilution of 1/160, therefore a titre of 1/320 was taken as positive. This was possible because the actual cases of typhus in Urundi all gave positive reactions in high dilutions even up to 1/50,000. Sixty per cent. of the cases gave a reaction in a dilution of 1/5,000. Some of the cases of typhus gave positive reactions for many months after the fever had ceased ; it was noted that this depended not so much on the severity of the fever but occurred in the cases from certain districts. For agglutination tests fresh emulsions of *Proteus* bacilli were utilized and a reading was made after 1 hour in the incubator, a second reading 4 to 6 hours later and a third at 12 to 18 hours. In positive cases the titre was found to be doubled at the second reading.

The difficulties of diagnosis were overcome by close collaboration between clinic and laboratory and prophylaxis based on this diagnosis was a complete success.
D. H.

PASRICHA (C. L.), BANNERJEE (K.) & LAL (S.). **Immunological Methods in the Determination of Infection in a Random Sample of Hospital Admissions. Part II. (The Frequency and Concentration of Agglutinins for *Proteus X* Strains in a Series of Hospital Patients.)**—*Indian Med. Gaz.* 1936. June. Vol. 71. No. 6. pp. 320–322.

The sera of 280 patients in hospital were tested against O emulsions of X19, X2 and XK. These people were all natives of India and were suffering from various diseases but none had typhus and none gave a history of recent typhus infection.

The results were as follows :—

	Number tested	1/25	1/50	1/100
		Per cent.	Per cent.	Per cent.
X19	280	55.7	23.2	1.4
X2	259	11.2	2.7	—
XK	77	68.8	29.8	7.8

D. H.

BLANC (Georges), NOURY (M.) & BALTAZARD (M.). L'état de pré-munition contre le typhus exanthématique chez l'homme. Simple et double vaccination. [**Premunition in Exanthematous Typhus in Man : Single and Double Vaccination.**]—*Bull. Acad. Méd.* 1936. July 7. 100th Year. 3rd Ser. Vol. 116. No. 26. pp. 33–37. With 3 charts.

Thirty-four persons were inoculated with a bile treated virus ; there was no reaction in any of them and in none was there a positive Weil-Felix reaction ; the same virus, untreated, produced a typical mild attack of fever. Eight of these inoculated people were given a test dose of virus on the 12th day after inoculation ; there was no reaction whatever ; after a further 27 days they received another test dose and again did not react.

The authors consider that up to the 12th day protection is due to the presence of the virus in the body (premunition) and after the 12th day when the virus has disappeared protection is due to immunity produced by the vaccine.

D. H.

BLANC (Georges) & NOURY (M.). Le phénomène de pré-munition chez le cobaye au cours de l'infection typhique. [**Phenomenon of Premunition in the Guinea-pig in Course of Typhus.**]—*C. R. Soc. Biol.* 1936. Vol. 122. No. 20. pp. 522–523.

If guinea-pigs are inoculated with the virus of true epidemic typhus and on the 1st and 2nd day after inoculation are reinoculated with the virus of murine typhus, they develop fever and scrotal swelling ; but if they are reinoculated from the 3rd to 7th day fever follows but no scrotal swelling is seen and the fever is due to the true typhus virus only. If these animals which have been reinoculated during the incubation period are killed during the period of fever, only the virus of true typhus can be isolated from them.

D. H.

DONATIEN (A.) & LESTOQUARD (F.). Existence de la prémunition dans la Rickettsiose naturelle ou expérimentale du chien. [**Pre-munition in Rickettsiosis of Dogs.**].—*Bull. Soc. Path. Exot.* 1936. Apr. 1. Vol. 29. No. 4. pp. 378-383.

The authors have already reported this Rickettsiosis of dogs which is carried by the dog tick *R. sanguineus*. The acute illness is severe and the disease is often fatal; Rickettsia can be readily demonstrated in the lungs and liver of sick animals by puncture during life, and in the brain post-mortem. The virus can be demonstrated in the animals for some months after the fever has ceased. *D. H.*

CIUCA (M.), BALTEANU (I.) & CONSTANTINESCO (N.). Réceptivité du chat au virus exanthématique. Infection spontanée. Forme inapparente. [**Susceptibility of the Cat to Typhus Virus: Spontaneous Inapparent Infection.**].—*Bull. Acad. Méd. Roumanie.* Paris. 1936. Vol. 1. No. 2. pp. 271-274.

—, — & —. Contribution à l'étude épidémiologique du typhus. Réceptivité du chat au virus exanthématique. Infection spontanée inapparente.—*Arch. Roumaines Path. Expér. et Microbiol.* Paris. 1936. June. Vol. 9. No. 2. pp. 283-297. With 14 figs.

A normal cat was fed on the tissues of an infected guineapig; the cat did not develop fever and the Weil-Felix reaction was negative; the animal was killed on the 37th day of the experiment and emulsion of the brain injected into guineapigs. Typical fever developed and the animals were later shown to be immune to typhus virus. A second and third cat were treated in the same way and both became infected, although neither had any fever or other symptoms of illness. Half of the brain of an infected guineapig was injected intraperitoneally into a cat, but no fever followed although later the brain of the cat was proved to be infective.

Three cats were taken from houses where cases of typhus had occurred; these animals were killed and the brain emulsion inoculated into guineapigs and they developed fever. Three cats were procured from a district where no typhus cases had occurred and these animals proved to be non-infective. *D. H.*

BLANC (Georges). Histoire et enseignements d'une vaccination contre le typhus exanthématique faite à Petitjean (Maroc). [**Typhus Vaccination at Petitjean (Morocco).**].—*Rev. d'Hyg. et de Méd. Préventive.* 1936. Apr. Vol. 58. No. 4. pp. 252-272. With 10 figs.

Up to the present no fewer than 11,216 persons have been vaccinated with living bile-treated typhus virus by the author and his co-workers. In this paper details are given of the vaccination of the entire population of a town of 6,000 inhabitants in one day. At the time when these vaccinations were carried out cases of typhus were occurring in the town and in villages near at hand; no attempt at decontamination of the people or their clothing was made.

The method of the preparation of this vaccine has already been described but very full instructions are given in the present paper;

roughly the method is that infected guineapigs are killed on the spot and emulsions are made from the tunica, the spleen and suprarenal glands; ox bile to a strength of 5 per cent. is added to the emulsion and allowed to act for exactly 15 minutes, then 1 cc. of the bile treated vaccine is inoculated under the skin. One guineapig supplies sufficient vaccine to inoculate about 1,000 persons.

The organization on this occasion was so complete that 8,234 persons were vaccinated in one day at a rate of about 30 per minute. Three people developed fever within 24 hours; 12 developed slight fever 10 days later, these fevers were probably due to the vaccine, which is of course a living virus; the strain is a murine one which produces only a very mild fever in man. Nine cases of typhus occurred among the vaccinated; these were cases of true louse-borne typhus and not murine typhus. Twenty-seven days after the vaccination there were no more cases of typhus among the vaccinated although cases continued to occur for some months among the people in the surrounding country who had not been inoculated. Although so many were inoculated with a living virus these people in no way formed a source of infection for others as the ectoparasites such as fleas and lice are unable to obtain the virus from the blood of those inoculated and these people rapidly acquire an immunity.

D. H.

GAUD (M.). Sur les résultats de la vaccination contre le typhus exanthématique par la méthode de Georges Blanc (épidémie de Petitjean).—*Bull. Office Internat. d'Hyg. Publique*. 1936. *supr.* Vol. 28. No. 4. pp. 664-667.

GIROUD (Paul). Comportement du virus du typhus historique de Tunis au cours de la carence et de la préarence C. [**Behaviour of the Historic Typhus Virus (Tunis) in relation to Normal and Deficient Diets.**].—*C. R. Soc. Biol.* 1936. Vol. 121. No. 8. pp. 714-715.

Guineapigs were fed on a diet which had been deprived of all vitamin C. These animals were then inoculated with the virus of epidemic typhus, the majority of the animals developed an orchitis and severe fever but when the strain was passaged to animals on normal diet no abnormal symptoms were noted.

D. H.

GIROUD (P.). Action de la carence C sur l'immunité acquise des cobayes infectés de typhus exanthématique. [**Influence of Diet on Acquired Immunity to Typhus in Guinea-pigs.**].—*Bull. Soc. Path. Exot.* 1936. Apr. 1. Vol. 29. No. 4. pp. 372-373.

The authors took 30 guineapigs which had been previously inoculated with typhus virus and had recovered. These were divided into two groups; one group was fed on an ordinary diet and the other group on a diet deficient in vitamin C. All the animals were then given a test dose of a typhus virus; none reacted, but from two of the animals fed on C deficient diet the virus was recovered from the brain. The author argues that deficiency of C may give rise to latent infections even in protected animals and that this may in part explain the association of typhus epidemics with famine.

D. H.

KAWAMURA (Kazuo). **Verification of Virus (Rickettsia) in the Urine of Patients and Guinea Pigs infected with Typhus Fever in a Broad Sense.**—*Jl. Oriental Med.* 1936. May. Vol. 24. No. 5. [In Japanese pp. 1051–1063. With 1 plate. English summary. p. 75.]

The urine of patients suffering from typhus was injected intraperitoneally into guineapigs and these animals became infected if the urine was taken in the first week of the fever. The urine of infected guineapigs was also proved to be infective for other animals when injected intraperitoneally. D. H.

LE CHUITON (F.), BERGE (Ch.) & PENNANÉAC'H (J.). Inoculation au cobaye par la voie testiculaire de sang de malades atteints du typhus endémique bénin de Toulon. Recherche de l'immunité des souches isolées vis-à-vis d'une souche murine. [**Testicular Injection into Guinea pigs of Blood from Individuals with Benign Endemic Typhus of Toulon. Immunity Tests with Viruses Isolated vis-a-vis a Murine Strain.**].—*Bull. Soc. Path. Exot.* 1936. June. 10. Vol. 29. No. 6. pp. 632–638.

The blood of 16 cases of typhus from cruisers in Toulon Harbour was inoculated into the testicle of guineapigs. The clinical diagnosis was established in all the cases and the Weil-Felix reaction was positive. 3 cc. of the blood was inoculated intraperitoneally and 1.5 cc. into the testicle; the guineapigs were observed for 24 days and fever usually commenced from the 8th to the 13th day. By the intratesticular route, 11 times a strong positive reaction, 4 times a mild reaction, 1 negative. By the intraperitoneal route, 2 gave a strong positive, 5 gave a mild reaction, 2 of the guineapigs died, 7 were negative. D. H.

ZIA (Samuel H.) & WU (Chao Jen). **Serum Treatment of Experimental Typhus.**—*Chinese Med. Jl.* 1936. Feb. Supp. No. 1. pp. 270–274. With 4 charts.

The authors obtained a supply of anti-typhus horse serum from Professor ZINSSER. Doses of 1 cc. of this serum were given to guineapigs at intervals of 48 hours after infection with the local (Peiping) strain of typhus virus; there was definite evidence of protection. When a single dose of 2 cc. of serum was given the results were still better. Even when the fever had commenced before the dose of serum was given there was some evidence of protective power—a milder infection with shorter duration of the fever. D. H.

FLIPPIN (Harrison F.). **Rocky Mountain Spotted Fever in Pennsylvania.**—*Amer. Jl. Med. Sci.* 1936. May. Vol. 191. No. 5. pp. 685–689. With 1 fig. & 1 chart.

The author describes a typical case of Rocky Mountain fever, eastern type, which occurred in Pennsylvania; the patient was a woman aged 45, who two weeks before the fever developed had removed and crushed the ticks from her pet dog. A profuse general rash which involved also the palms of the hands and soles of the feet is illustrated. [The

excellent photos illustrating this point remind one of those already published of cases of boutonneuse fever.] The Weil-Felix reaction was positive for *X19* and *X2* in a dilution of 1/200, negative for *XX*.

D. H.

MAXCY (Kenneth F.). **The Weil-Felix Reaction of the Rabbit in the Diagnosis of Rocky Mountain Spotted Fever (Eastern Type).**—*Jl. Infect. Dis.* 1936. May-June. Vol. 58. No. 3. pp. 288-292. [10 refs.]

The Weil-Felix reaction is usually relied on for the diagnosis of Rocky Mountain fever; but for various reasons it may not be possible to obtain serum—for instance in fatal cases the agglutinins may not have had time to develop. Maxcy therefore has employed the method of inoculating the blood of cases of fever into rabbits and testing the Weil-Felix reaction of the serum of the rabbits later. Eight cases have been tested in this way. Emulsions of formalized non-motile *X19* and *X2*, pure *O* varieties, are employed and the macroscopic method is used. The emulsion and dilution of serum are kept for 4 hours at 55° and then in the refrigerator overnight at 4°C. In order to obtain a positive reaction it is essential that the blood should be taken from the patients before the 9th day of the fever. 3 cc. of citrated blood is injected intraperitoneally into the rabbit within one hour of withdrawal from the patient. For a positive reaction to be recorded it is necessary that there should be rising and falling titre of agglutination in the rabbit serum. Of the 8 cases 2 were fatal; 6 of the 8 rabbits developed agglutinins, 4 for *X19* and 2 for *X2*. The agglutinins rapidly disappeared from the blood of the rabbits. The two failures are accounted for by the fact that in one instance the case was very mild and the blood was not taken until the 9th day; in the other case the blood, owing to a mistake, was kept for 4 hours after withdrawal before inoculation.

D. H.

KURODA (Osamu). Experimentelle Studien ueber eine intrakutane Reaktion bei Tsutsugamushikrankheit. [**Experimental Study of an Intracutaneous Reaction in Tsutsugamushi Disease.**]—*Zent. f. Bakt.* I. Abt. Orig. 1936. Mar. 24. Vol. 136. No. 3/4. pp. 163-172. [23 refs.]

The author refers to earlier work in which emulsions of infected lice were used as antigen for intradermal injection for diagnosis of true typhus cases; later on emulsions and filtrates of *Proteus X19* have been employed for the same purpose.

The author has utilized filtrates of *OXX* for intradermal injection for diagnosis and prognosis in tsutsugamushi disease. He considers that *XX* is not merely a variant or mutant of *X19* but is a distinct individual germ differing morphologically, biologically and serologically from *X19*.

These filtrates were injected intradermally into healthy young men and in 100 per cent. of cases a positive reaction resulted after an incubation period of one or two hours—occasionally in children and old men a negative result is obtained.

The test was employed also in people suffering from fevers, typhoid, tuberculosis, etc., and all gave a positive result.

In tsutsugamushi fever in the first few days a positive reaction was obtained, but after the 6th or 7th day a negative reaction resulted and this negative condition persisted for at least a month, and often longer ; in very severe cases the positive reaction could be obtained till later in the fever ; it is on this point that the author relies for aid in prognosis. Various experiments were carried out on rabbits and guineapigs and with the antisera prepared from rabbits or obtained from convalescents the results of these experiments show that the reaction is a true allergic reaction.

D. H.

DENGUE AND SANDFLY FEVER.

HANSON (Henry). **An Epidemic of Dengue.**—*Amer. Jl. Public Health.* 1936. Mar. Vol. 26. No. 3. pp. 256-258.

This paper contains an account of an epidemic of dengue in Florida which was controlled by an active campaign directed against the breeding places of *Aedes aegypti*. In contrasting the measures required when dealing with prevention of yellow fever it is pointed out that in yellow fever there is a solid and lasting immunity, whereas after dengue immunity is only partial and may only last for a few weeks.

If dengue breaks out in a community in which dengue has not occurred for some years it is necessary not only to reduce the number of mosquitoes but to remove them entirely, whereas in yellow fever in a community where immune people are present reduction of numbers of mosquitoes may be sufficient to check the disease ; entire elimination is not essential.

In Miami the city was divided into 50 districts and an inspector and staff were appointed for each district.

The author emphasizes the necessity of providing trained workers for supervision ; inspection of areas in which relief workers had been employed revealed numerous breeding places which had been overlooked.

The " container born " mosquitoes must be reduced to zero to check dengue ; even a more intense campaign than is required to stop yellow fever.

D. Harvey.

HANSON (Henry). **Some Observations on Dengue.**—*Amer. Jl. Trop. Med.* 1936. May. Vol. 16. No. 3. pp. 371-375.

This is an account of the prevention and stamping out of dengue by means of antilarval methods ; a previous paper by the same author is summarized above.

A favourite site for breeding *A. aegypti* is in old motor tyre covers ; 112 tyres in one heap were all found to be breeding places.

As already pointed out by the author it is necessary to reduce the number of mosquitoes to zero in order to stamp out dengue, whereas in the case of yellow fever reduction of numbers may be sufficient.

D. H.

SOFIEV (M. S.). **[The Blood-feeding Habits of Sandflies.]**—*Bull. Inst. Epidemiol. & Microbiol.* Tashkent. 1935. Vol. 3. No. 1. pp. 52-55. [In Russian.]

Using the sera of man, horse, donkey, sheep, ox, dog, rat and frog, the author employed the precipitin reaction to determine the nature of

the blood ingested by sandflies caught in Tashkent. The results of the examination of 496 sandflies were as follows :—

Species of <i>Phlebotomus</i>			Total No. examined	Reaction positive	Reaction negative	Per cent. positive to human serum
<i>papatasi</i>	...	...	367	196	171	52.5
<i>chinensis</i>	...	...	48	23	24	56.5
<i>sergenti</i>	...	...	28	18	10	55.5
<i>caucasicus</i>	...	...	32	14	18	57.1
<i>major</i>	...	...	1	1	0	0
<i>borovskii</i>	...	...	1	0	1	0
Undetermined	...	...	19	8	11	(?)

It is seen that more than 50 per cent. of the species of sandflies commonly found in Tashkent feed on human blood, from which it can be assumed that they are equally anthropophilic and zoophilic in their feeding habits.

C. A. Hoare.

LEPROSY.

DOULL (James A.), RODRIGUEZ (José N.), GUINTO (Ricardo) & PLANTILLA (Fidel C.). **A Field Study of Leprosy in Cebu.**—*Internat. Jl. Leprosy*. Manila. 1936. Apr.–June. Vol. 4. No. 2. pp. 141–170. With 4 text figs. & 11 figs. on 3 plates.

The Philippine Island of Cebu has only one-twelfth of the total population but has produced one-quarter of the registered lepers, so a portion of it was selected for a field study of the distribution of the disease. A skin dispensary had previously been started to gain the confidence of the people, and very few of them objected to a practically complete examination of their bodies for lesions with special reference to household and family infections. The climate is humid, the people poor and the diet mainly of fish. No less than 5,987 of the 6,063 registered population were seen, or 98·3 per cent., and 104 leprosy cases, or 1·72 per cent., were found, or if apparently quiescent or arrested cases are excluded, 1·34 per cent.; including 30, or 29·0 per cent., unknown previously to the Bureau of Health, but only 3 of these were bacteriologically positive against 43 under previous control. A study of the location of the first lesions confirmed ROGERS and MUIR's statement that a large proportion, 91 per cent., occur on the extremities exposed to injury. The age distribution supported the view that early infection is the rule and that males suffer most in adult life, but not in childhood; this is most readily explained by greater exposure of males to infection after childhood. Previous contact with a leprosy patient, at least as intimate as sleeping in the same house, was met with in 38·5 per cent., and family contact in 26 per cent. In all but two instances the antecedent leper is known to have been bacteriologically positive. House overcrowding predisposed to infection, especially as regards sleeping accommodation. There was no serious deficiency of vitamin B as beriberi was rare. Yaws is very prevalent, but no difference was found in the leprosy incidence of yaws infected and other families, and no relation to the prevalence of other skin diseases. If a similar relationship between the segregated and the total cases obtains in the rest of the Philippines the total would be about 20,000.

L. Rogers.

HOLLAND (E. M.). **Leprosy in New Guinea.**—*Internat. Jl. Leprosy*. Manila. 1936. Apr.–June. Vol. 4. No. 2. pp. 171–176. With 1 fig.

A few lepers were known in this area in 1914, a focus was found in the Madang District in 1926; the author found 32 cases in New Ireland in 1928, and by 1935 there were 547 such patients with an incidence of 11 per mille in New Ireland, 59 per mille in New Hanover, and 200 per mille in the earliest infected villages; mostly mild, for 90 per cent. were nerve cases. In 10 per cent. the lesions appeared in childhood, and the majority about puberty or early adult life. These data were obtained by trained patrolling officers examining the whole population completely every few months. Treatment by alepol and moogrol has cleared up 52 of 546.

L. R.

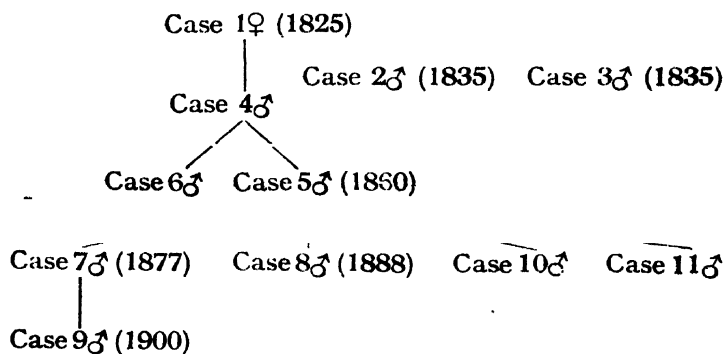
MACKENZIE (J. Noble). **A Note on Leprosy Work in Korea.**—*Internat. Jl. Leprosy.* Manila. 1936. Apr.–June. Vol. 4. No. 2. pp. 215–218.

The well-known institution at Fusan in Korea now has almost 600 patients and 22 children of lepers. The case mortality has been reduced by injections of hydnocarpus oil with 1 per cent. creosote from 25 to 2 per cent., and 60 to 70 recovered patients are being discharged annually. The Japanese Government have recently notified that all leper institutions must be registered under the rules for the isolation of infective diseases. At present not more than 6,000 of the estimated 20,000 in Korea are hospitalized. The author thinks that the greater proportion of known male to female lepers is due to the latter keeping going and the disease at bay longer. *L. R.*

LEPROSY REVIEW. 1936. July. Vol. 7. No. 3. pp. 101–150. With 9 figs. & 1 map on 6 plates & 2 diagrams.—Quarterly Publication of the British Empire Leprosy Relief Association, 131 Baker Street, London, W.1. [2s.]

A report on leprosy in the Cayman Islands by the Medical Officer (unnamed). The disease is stated to have made its appearance about 1825 and its subsequent history is recorded, with the following interesting diagram tracing the infection of fifteen cases from one patient to another down to 1904.

Georgetown



West Bay

Case 12 ♂ Case 13 ♀ Case 14 ♂
Case 15 ♂ (1904)

Lines show course of infection

An abstract of the report of Fiji for 1934 states that in the leper island of Makogai the cases from various British Pacific Islands receive treatment and care unsurpassed in the world. [This affords a good example to the isolated efforts of the smaller British West Indian Islands.] The incidence in different islands varies from one to two per cent. of the population. The admissions numbered 89, half of them nerve cases, only two with deformities, and none advanced cutaneous ones; this is due to the importance of early diagnosis and treatment being now realized by doctors and patients. The standard treatment is weekly intramuscular injections of chaulmoogra oil with 0.5 per cent. of iodine, warmed and kept in a thermos flask or in glass vessels standing in hot water to reduce its viscosity, and this much cheaper preparation

gave as good results as ethyl esters. Recoveries numbered 29 in the year. The patients do much towards growing their food supplies, including fowls and their eggs. In spite of damage by storms about 100 *H. wightiana* trees supply about three pints of oil, but the *H. anthelmintica* are less healthy and have not yet borne fruit.

* Brief reports from several British African Colonies are also summarized in this issue. L. R.

BINFORD (C. H.). **The History and Study of Leprosy in Hawaii.**—*Public Health Rep.* 1936. Apr. 10. Vol. 51. No. 15. pp. 415–423. With 4 figs. on 2 plates.

This note relates the oft-told tale of leprosy in the Sandwich Islands, and the prolonged attempts to reduce it by means of compulsory isolation, the influence of which is said to have been very doubtful. L. R.

LEPROSY IN INDIA. 1936. Apr. Vol. 8. No. 2. pp. 43–91. With 6 figs. on 3 plates. Issued quarterly by the Indian Council of the British Empire Leprosy Relief Association.

The only original paper in this number is an address to the Mission to Lepers Conference in Calcutta on February 6th, 1936, by Dr. J. LOWE on Modern thought on Leprosy and its bearing on Mission work in India. He considers that although no one advance of major importance has been made recently, yet a number of bits of knowledge put together have greatly altered for the better the aspect of the leprosy problem. The optimism regarding treatment that began about twenty years ago has been replaced by a swing of the pendulum, perhaps too much, in the other direction. The isolation of infectious cases, particularly from young children is of prime importance. In Japan separation of children from their parents, and sterilization of patients, are regarded as very important measures. Quality rather than quantity of measures should be aimed at. Further investigations on treatment and epidemiology are required. The mission leprosy institutions are making a valuable contribution to anti-leprosy work in India. L. R.

MAXWELL (James L.). **The Task before us.**—*Chinese Med. Jl.* 1936. May. Vol. 36. No. 5. pp. 716–720.

This is an address, on very similar lines to the above, on the leprosy position in China, where the problem is a most difficult, but not an insoluble, one. Surveys to throw light on the distribution and epidemiology of the disease are urgently needed. "It must be made clear to our legislators that penal laws are no more suitable for leprosy than for any other disease and that the use of force will tend to spread not to limit leprosy." He advised the formation of a Council on Leprosy by the Chinese Medical Association. L. R.

MORA (A. Damas) & SOARES (J. C.). **Leprosy in Macao. Some Comments by the Portuguese Doctors in Macao.**—*Chinese Med. Jl.* 1936. May. Vol. 50. No. 5. pp. 721–725.

According to this account the Portuguese established an asylum for lepers in the Chinese port of Macao as early as 1569, and at the beginning of the 17th century the inmates numbered about 70. In 1930 a

separate new institution was built for women, but it could not be completed because no one would take on the work when the contractor developed leprosy. Among 150,000 people police search discovered 50 to 60 patients, who are receiving the usual treatment. *L. R.*

PEREIRA (Loiola). Contribution to the Study of Leprosy in Goa.—Reprinted from *Med. Digest*. 1936. Mar. Vol. 3. No. 12. pp. 540–542. With 1 chart.

This brief note records that the age incidence of leprosy in Goa was found to be higher than usually reported; for only 16.68 per cent. showed the first signs by the age of 20 years, nearly one-fourth at 31 to 35, more than half between 21 and 40 years of age, and two-thirds between 21 and 45. *L. R.*

INNES (James Rose). Occupation and Leprosy.—*Med. Jl. Australia*. 1936. June 13. 23rd Year. Vol. 1. No. 24. pp. 815–818. [14 refs.]

HURWITZ (Ezra) & ANDERSON (Hamilton H.). Leprosy in Panama. First Thirty Years of Segregation.—*Amer. Jl. Trop. Med.* 1936. May. Vol. 16. No. 3. pp. 353–369. With 1 chart. [13 refs.]

Since 1904, 320 leprosy patients have been segregated in Panama, half of whom were born in other areas of the Caribbean, and only three were born in the Canal zone. Only 33 children have been admitted. Fifteen arrested cases prefer to remain in the colony. None of the 17 uninfected persons employed in the colony up to as long as twenty years show any signs of leprosy. Forty-four patients have been paroled by a board of three members, 142 have died, 18 absconded, 18 have been repatriated and 12 readmitted since 1904. Tuberculosis and nephritis were the commonest causes of death, as usual. The average age of onset was 31 years and the duration of the disease on entering the colony 3.7 years. The duration of the disease in the present group of 108 has averaged 9.84 years to date. Esters are now being used, mainly intradermally. Cases improving under chaulmoogra therapy show lower unsaturation and higher total lipoids in their blood than those who are quiescent or deteriorating. *L. R.*

MEDEDEELINGEN VAN DEN DIENST DER VOLKSGEZONDHEID IN NEDERLANDSCH-INDIË. 1936. Vol. 25. No. 1. pp. 1–95.—[15 papers on Leprosy in the Netherlands Indies.]

SITANALA (J. B.) & KODYAT (R.). Lepra-Untersuchungen auf Java. [Leprosy Investigations in Java.]—*Arch. f. Dermat. u. Syph.* 1936. May 15. Vol. 174. No. 2. pp. 143–165. With 8 figs.
——. *Leprabekämpfung. [Leprosy Control.]*—*Ibid.* pp. 182–189.

This series of papers on leprosy in the Dutch East Indies is largely of local interest. The most important is one on the present Government policy. In 1897 they accepted the finding of the first International Leprosy Conference in favour of the principle of compulsory segregation, but it has never been legally enforced, and a Bill of 1925 making it possible was rejected. In 1930 the Leprosy Commission of the League of Nations at Bangkok under the heading of "Principles of the prophylaxis of leprosy" concluded: "In the present state of knowledge regarding leprosy prophylaxis the most important line of attack, in

addition to that by isolation, is by treatment—where efficient treatment is possible, segregation may be made less rigorous on the condition that it is supplemented by out-patient treatment.” The Manila Leprosy Conference of 1931 endorsed this principle and “the leprologists assembled at Manila regarded the compulsory segregation of lepers to be a merely secondary consideration.” The Netherland Indies Government officially recognized this new course of action in 1930–31, and a program drawn up by SITANALA is now being put into practice under him. The Queen Wilhelmina Jubilee Foundation is employing its funds on scientific leprosy research in a special institute, and a leper section and laboratory have been established in a Central Civil Hospital. Early cases are sought out and treated, especially in the young. Infective cases are being isolated locally at the expense of their communities. In short, modern methods based on recently acquired knowledge are being adopted.

Surveys have shown 3 per mille cases in Celebes, 3 to 9 per mille on Small Kei Island, and up to 17 per mille in mountain villages. L. R.

GERMOND (R. C.). **A Study of the Last Six Years of the Leprosy Campaign in Basutoland.**—*Internat. Jl. Leprosy*. Manila. 1936. Apr.–June. Vol. 4. No. 2. pp. 219–224. With 3 figs.

This paper adds little to the recent one of P. D. STRACHAN (this *Bulletin*, 1936, Vol. 33, p. 295). The addition of further trained inspectors is believed to mark the beginning of a new and more hopeful era, for the admissions increased steadily between 1929 and 1933, with a slight decrease in 1934. More important, there has been a great shortening of the duration of the disease before admission, for in 1924 in only 31 per cent. was it one year or less, and in 37 per cent. over two years, against 57 and 25 per cent. respectively in 1934. The great majority of new cases now belong to the milder neural and tuberculoid forms. L. R.

WAYSON (N. E.). **The Early Diagnosis of Leprosy. The First Clinical Findings observed in Segregated Children of Leprous Parents.**—*Internat. Jl. Leprosy*. Manila. 1936. Apr.–June. Vol. 4. No. 2. pp. 177–188. With 8 figs. on 2 plates.

This is an interesting account of the closely observed earliest symptoms in 108 children, nearly all of whom had been removed from their leprous parents at birth or soon after. Their ages varied from a few months to sixteen years, and thirty-five of them were found to exhibit at some time one or more of the changes that are considered to be possibly early signs of leprosy, but which may disappear again in some cases. X-rays may be helpful in detecting early bone changes. Of the 35 the suggestive changes in 25 have so far failed to develop any sensory disturbances, or any combination of changes which would justify a definite diagnosis of leprosy; but 10 have developed such changes. One, a boy of ten, is positive bacteriologically, with typical skin and nerve lesions.

“Among the remaining nine cases the following clinical findings have been obtained, either at the first examination or subsequently, in the numbers of patients indicated: Lagophthalmos, 8; droop of an angle of the upper lip, 6; atony or slight atrophy of the muscles of the interosseous spaces or of the thenar or hypothenar eminences, 6;

paresis or paralysis of the lumbrical or interosseous muscles of the hand, 1; thickened nerve trunks or branches, auricular, ulnar, or peroneal or (in one case) supraclavicular, 9; trophic disturbances, dryness or anhydrosis, scaliness, glossiness or wrinkling, in one or more areas of the skin other than in definitive lesions, 5; sensory disturbances in one or more areas of the skin without definitive lesions, 5; circumscribed or definitive skin lesions (macules), 4; sensory changes in one or more macules, 4."

The diagnosis was only made in these from a combination of findings including sensory disturbances. In four of the nine typical bacteria were demonstrated after several attempts. L. R.

LEFROU (G.) & DES ESSARTS (J. Quérangal). Contribution au diagnostic des faux lépreux. Les macules de vitiligo. [**The Diagnosis of Lepra-like Conditions. Leucoderma.**]*—Bull. Soc. Path. Exot.* 1936. May 13. Vol. 29. No. 5. pp. 459-464.

This note deals with the differentiation of leprosy lesions from leucoderma. Stress is laid on the absence of anaesthesia, and lepra bacilli in the latter, or any thickening of the skin that can be felt with the eyes shut, as well as the absence of any inflammatory changes microscopically. L. R.

TAJIRI (Isamu). **Leprosy and Childbirth.***—Internat. Jl. Leprosy.* Manila. 1936. Apr.-June. Vol. 4. No. 2. pp. 189-194. With 4 figs. on 1 plate.

It is commonly held that leprosy is liable to become aggravated during pregnancy and in the puerperal period, but few actual data are available on the subject. The author furnishes these in relation to the birth of 112 children to leprosy infected mothers in the Okayama National Leprosarium of Japan. His conclusions are well summarized as follows:—

"1. Of 112 leprosy women at Aisei-en who have had children, 39 (34.8 per cent.) developed the disease during pregnancy or shortly thereafter.

"2. In 100 pregnancies that occurred in women with leprosy, exacerbation of the disease occurred 48 times, the remaining 52 being uneventful in this respect.

"3. Though the initial symptom of leprosy is usually a simple macule, or anesthesia, the symptoms that appear in pregnancy or childbirth are usually acute lesions, the so-called "rash," often appearing as numerous active macules and frequently with edematous, erysipelas-like swellings of the face.

"4. In the case of abortion there usually is little advance of the disease, though occasionally a case becomes worse in spite of it.

"5. It is evident that for women who are in the incubation stage of leprosy, pregnancy and childbirth are liable to precipitate the development of the disease, and for those who have leprosy childbearing is apt to lead to its exacerbation and extension." L. R.

BERNY (H.). Quel est l'avenir des enfants nés de mères lépreuses? [**The Future of Infants born to Leprous Mothers.**]*—Bull. Soc. Path. Exot.* 1936. May 13. Vol. 29. No. 5. pp. 469-471.

GIRARD, in 1933, showed that only very early separation from their leprosy mothers will save infants from infection. HASSELTINE in Molokai met with no infections among 109 infants rapidly removed after birth from the leper colony, but of those who lived in contact with their

mothers no less than 56 per cent. became infected. HOLMANN reported 4 per cent. of infections after 4 years 8 months, and 15 per cent. after 7 years 6 months residence with their infected mothers. The author records that three infants removed at birth from mothers suffering from fully developed nodular leprosy remained healthy, but 40 per cent. of ten infants remaining with such mothers developed the disease, and two of four infants of earlier dermal leprosy patients were also infected. On the other hand, three infants of nerve type mothers remained healthy.

L. R.

ALEIXO (A.). *Lepre e traumatismo.* [**Leprosy and Trauma.**—*Folha Med.* 1936. July 15. Vol. 17. No. 20. pp. 277-285. With 3 figs. [59 refs.]

The author discusses the subject from several aspects and includes a few illustrative cases showing how the disease in a state of latency may be unmasked (*desvendada*) by injury at a site where there are no apparent leprosy lesions and where the bacilli cannot be found; secondly, how injury of a leprosy lesion, in which bacilli are known to be present, may extend the infection locally and by the lymphatics bring about wider diffusion; thirdly, accidents or complications, ocular conditions, deformities of the extremities, may be attributed to the trauma when they are in reality due to the leprosy itself [this may be so primarily, but it would not be easy to differentiate the part played by trauma on a site perhaps anaesthetic owing to the leprosy]. Lastly, the situation and nature of a lesion may lead the physician to a diagnosis of leprosy where no bacilli can be demonstrated to confirm this, and further investigations show the non-leprosy nature of the condition. Two or three examples of this are given, one of which may be cited where a man sustained an injury to his right hand which resulted in anaesthesia of the ulnar aspect of the hand and of the fingers. He presented himself with an ulcer of the thumb which started in an injury 8 days previously. Leprosy was strongly suspected, but no bacilli could be found and both lesions were explicable by trauma alone.

H. H. S.

JUNIOR (Rabello). *Sarcoide de Boeck leprogenico.* [**Boeck's Sarcoid in Leprosy.**—*Rev. Brasileira Leprologia.* S. Paulo. 1936. June. Vol. 4. No. 2. pp. 123-136. With 19 figs. [35 refs.]

Is Besnier-Boeck's disease a condition distinct aetiologically from leprosy? The author is of opinion that at present it would be premature to give a categorically positive reply. It *might* possibly be due to a virus, as yet unknown, producing epithelioid granulomata resembling tuberculomata in tending to caseation and lepromata by their neurotropism. Meanwhile the following epitomizes our present knowledge of the subject:—

1. In leprosy sarcoid lesions of the skin and other tissues occur.
2. Leprosy seems with peculiar frequency to determine the site of these granulomata.

3. In leprosy a rhinitis may be set up indistinguishable from sarcoid of the same site and bacilli may be looked for in vain [this would seem rather begging the question; if the two here are not distinguishable, how can the author maintain that there are two conditions "resembling each other"?].

4. Leprosy is in a very large proportion of cases [the author states 95 per cent.] associated with indolent adenopathy analogous with sarcoids and histologically similar.

5. Pulmonary and bony lesions occur in leprosy radiologically indistinguishable from sarcoids.

6. Leprosy, even in its florid forms, is accompanied by cutaneous allergy to tuberculin, and the same holds good in the "so-called Besnier-Boeck disease" [there is no reason why both should not react to tuberculin].

7. Leprosy, especially the tuberculoid forms, benefits from antileprol as does sarcoid.

H. H. S.

PANJA (Ganapati). Two Cases of Leprotic Abscess.—*Calcutta Med. Jl.* 1936. Apr. Vol. 30. No. 10. pp. 605-606. With 1 fig.

MUIR (E.) & CHATTERJI (S. N.). A Study of Nerve Leprosy.—*Indian Jl. Med. Res.* 1936. July. Vol. 24. No. 1. pp. 119-138. With 6 plates.

This illustrated study of the history and clinical conditions, with pathological and bacteriological examinations of portions of removed tissues, in eighty-one cases of leprosy cannot better be summarized than in the authors' own conclusions. It should be read in the original by all interested.

" 1. Bacilli enter and pass up nerve branches from the neuro-vascular plexuses of the skin. This may, or may not, be accompanied by clinical skin lesions. Either the local branches, or the distant main nerves, or both, may show clinical changes. Bacilli lie in close connection with neuro-vascular plexuses in the skin and subcutaneous tissue. The nerve bundles form a specially favourable medium for the growth of *M. leprae*.

" 2. Bacilli are carried up the nerves from the skin by the lymph flow. They tend to accumulate at points of obstruction.

" 3. The 'neurotropism' of *M. leprae* is discussed. This is shown to be at least partly connected with the comparative absence of cellular response to the bacilli in the nerves.

" 4. The endothelial cells of the capillaries take the most important part in the response to *M. leprae* in both the skin and the nerves. In the latter the bacilli are isolated from the endothelial cells of the centrally placed capillary by the medullated nerve fibres, and thus may escape phagocytic destruction. In the skin the bacilli lie in close proximity to the endothelial cells, and are thus more liable to be phagocytosed.

" 5. The effects of varying degrees of cellular reaction to lepra bacilli in the skin and in the nerves are discussed, especially with regard to the formation of nerve abscess.

" 6. Apart from the degree of local concentration of bacilli, there are three factors which account for varying degrees of resistance and cellular response to *M. leprae*, viz., specific resistance, general health and allergic reaction.

" 7. The course of events is traced in the formation of caseation and nerve abscess; the forms which nerve abscesses assume are described and discussed in relation to their effect on nerve functions.

" 8. The nerves form an important reservoir for bacilli where they may multiply until sufficient tolerance is produced to overcome the greater resistance in the skin. This is followed by spreading of the bacilli to other nerves, and frequently by generalized infection.

" 9. Pain and other symptoms are relieved in suitable cases by excision of the nerve sheath of thickened nerves, opening of abscesses and excision

of diseased nerve branches. A distinction is made between primary and secondary anaesthesia.

" 10. ' Recovery reaction ' is distinguished from allergic reaction."

L. R.

GRIECO (Vicente). Estudo clinico e histologico de um caso de nevrite hanseniana tuberculoide com caseificação e ulceração (abcesso de nervo). [*Clinical and Histopathological Study of a Case of "Nerve Abscess" in a Leper.*].—*Rev. Brasileira Leprologia*. S. Paulo. 1936. June. Vol. 4. No. 2. pp. 151-201. With 35 figs. [18 refs.]

This is a very minute and detailed study of the case of a leper, 24 years of age, with a lesion in the lower third, antero-external surface, of the right leg. The lesion consisted of two ulcers about 4 cm. apart, and on the dorsum of the foot was an anaesthetic macule. The ulcers were in relation to the musculo-cutaneous nerve; this nerve-branch was thickened and passed on to the site of the macule. In addition to chaulmoogra oil treatment, surgical intervention was undertaken and the nerve extirpated from the upper level of the swelling down to the macule. Now, a year later, there has been no further sign of the disease.

A large number of serial sections was made, stained and examined, and all stages could be made out, from an early proliferation of histiocytes and lymphocytic infiltration among the nerve fibres to the advanced stage of caseation.

H. H. S.

HOFFMANN (W. H.). Lepra und Bananen. [*Leprosy and Bananas.*].—*Muench. Med. Woch.* 1936. May 8. Vol. 83. No. 19. pp. 775-776.

Anxiety has been expressed concerning the possibility of leprosy infection being acquired in Germany through imported bananas.

The author considers the question and comes to the conclusion there is absolutely no basis for such an idea.

L. R.

KRIZ (J. R.). Biological Study of "R" and "S" Forms of Chromogenic Acid-Fast Bacillus from Human Leprous Lesion.—*Proc. Soc. Experim. Biol. & Med.* 1936. Apr. Vol. 34. No. 3. pp. 303-306.

The author has studied the variations in the colonies of an acid-fast bacillus isolated from a subcutaneous leprosy nodule and cultivated by the method of Duval. He separated "S" or smooth from "R" or rough forms. The "S" forms show smaller moist colonies, are acid-fast rods with 2-5 small granules, which he considered to be signs of degeneration. The "R" forms show larger wrinkled dry colonies, grow more rapidly, form a flaky suspension and are more thermostable. They also show mainly large bipolar granules resembling a spore stage, and the bacilli are surrounded by a thicker capsular zone. Both forms may remain pure on subculturing over several months, but the "S" form may revert to the "R" during adaptation on artificial media, and it must be assumed that they are reversible. The "S" is considered to be the typical and the "R" the mutant form. L. R.

VILLELA (Gilberto G.), CASTRO (Almir) & ANDERSON (Jeanette V. D.). Lipemia na lepra. [**Lipæmia in Leprosy.**]*—Rev. Brasileira Leprologia.* S. Paulo. 1936. June. Vol. 4. No. 2. pp. 111-120. With 3 graphs. [21 refs.]

The authors examined a hundred lepers showing the cutaneous, the nervous and mixed forms, and ranging in age from infancy to 40 years, and both white and coloured patients. They found that total lipids and fatty acids were above the normal in all, whereas the cholesterol was in general lowered. Neither the type of disease nor the treatment influences the lipæmia to any appreciable extent. As a general rule the whites showed higher levels than the coloured patients. H. H. S.

VILLELA (Gilberto G.), CASTRO (Almir) & ANDERSON (Jeanette van D.). Blood Lipid Studies in Leprosy.—*Jl. Trop. Med. & Hyg.* 1936. June 1. Vol. 39. No. 11. pp. 126-127.

VILLELA (Gilberto G.) & CASTRO (Almir). Le cholestérol et ses fractions dans le plasma des lépreux.—*C. R. Soc. Biol.* 1936. Vol. 123. No. 28. pp. 433-435.

ANDERSON (R. J.), CROWDER (J. A.), NEWMAN (M. S.) & STODOLA (F. H.). **The Chemistry of the Lipids of Tubercle Bacilli. XLIII. The Composition of Leprosin.**—*Jl. Biol. Chem.* 1936. Apr. Vol. 113. No. 3. pp. 637-647. **XLV. Isolation of α and β Leprosol.**—*Ibid.* June. Vol. 114. No. 2. pp. 431-439.

These two highly technical papers are best summarized in the authors' own words:—

XLIII. "Leprosin, a neutral wax-like substance isolated from the leprosy bacillus, has been analyzed and found to consist of a complex mixture of solid glycerides and waxes.

"The fatty acids liberated on saponification were myristic, palmitic, stearic, tetracosanic acids and a new hydroxy acid called leprosinic acid.

"The neutral portion of leprosin after saponification consisted of both water-soluble and ether-soluble components. Glycerol was the only water-soluble substance that could be detected.

"The ether-soluble unsaponifiable matter consisted of two higher, secondary, optically active alcohols. The less soluble alcohol was identified as *d*-eicosanol-2. A second alcohol, probably *d*-octadecanol-2, was also isolated."

XLV. "Two new alcohols, α - and β -leprosol, having phenolic properties, have been isolated from the unsaponifiable matter of the neutral fat from *Bacillus lepræ* and some of their properties have been determined."

L. R.

CHORINE (V.) & CROUGUE (O.). La cholestérine sanguine dans la lèpre murine. [**Cholesteroline in Leprous Rats.**]*—C. R. Soc. Biol.* 1936. Vol. 122. No. 21. pp. 621-624.

Most workers have reported finding a decrease in the cholesteroline in the blood of leprosy patients, but MARCHAND found it normal in early cases and BORGATTI found it to be increased. The authors have therefore investigated the changes in the case of rats infected with murine leprosy, both naturally and by inoculation, and found only slight

variations from the normal limits, although the figures were somewhat lower in infected than in healthy animals. Thus the average in normal rats was 0.65 against 0.57 in infected ones, but the difference is of very little practical value, as the diminution is far too inconstant to be of any diagnostic importance and shows no definite relationship to the severity of the infection present. The figures in some diseased rats may be as high as in healthy ones. L. R.

MALDONADO (L. García). La reacción de Kahn en la lepra. [**The Kahn Reaction in Leprosy.**—*Gac. Méd. de Caracas*. 1935. Dec. 31. Vol. 42. No. 24. pp. 380-381; 1936. Jan. 15 & 31. Vol. 43. Nos. 1 & 2. pp. 9-16; 27-28.]

Three significant cases are recorded: (1) A man of 20 years, with iritis of the right eye. There was no history of syphilis but a Kahn test gave 4 plus. Intensive antisyphilitic treatment had no effect on the reaction, and further examination revealed distinct evidence of a mixed form of leprosy—thickened ulnar nerves, zones of anaesthesia, falling off of the eyebrows, bacilli in nasal mucus. (2) A woman of 20 years, with papular lesions of the face. Kahn 4 plus, no improvement following two courses of antisyphilitic treatment. Leprosy bacilli found in large numbers in the papules. Intensive treatment with chaulmoogra brought about improvement in the clinical condition but did not affect the Kahn reaction. (3) A woman of 25 years, with epistaxis and "various nasal troubles." She was treated for syphilis, and the Kahn, 4 plus, was held to confirm the diagnosis. Two courses of arsenicals neither benefited the local condition nor changed the Kahn reaction. The author suspecting lepra examined some infiltrations which had appeared and found the bacillus. Chaulmoogra resulted in marked improvement, but the Kahn was still 3 plus.

He proceeded to examine many lepers in Providence Island as regards their Kahn reaction, and came to the conclusion that there at any rate the reaction was frequently positive even where syphilis and yaws could be excluded, and he sums up the question in rather obvious terms [reminiscent of the judge in *Bardell v. Pickwick*]: If in a leper the positive Kahn becomes negative under antisyphilitic treatment and at the same time the lesions improve, the reaction is to be regarded as due to the syphilitic element; if the lesions remain unchanged, but the reaction becomes negative under anti-syphilitic treatment, both diseases are present; if the Kahn becomes negative under treatment for leprosy, we ought to regard the reaction as having been due to the leprosy and not in any way the result of syphilis or yaws. Intermediate reactions are analogously interpreted quantitatively, whether reduced or not as the result of treatment. H. H. S.

LAI (Daniel G.) & CHEN (Wen Ying). **The Wassermann and the Kahn Reactions in Leprosy.**—*Chinese Med. Jl.* 1936. May. Vol. 50. No. 5. pp. 702-704.

The authors record 12 per cent. positive Kolmer-Wassermann and 21.5 per cent. Kahn positives in 167 ambulatory leprosy cases, but 40 per cent. positive Kahn tests in 78 Hangchow leprosarium patients. The complexity of the factors prevents them reaching any definite conclusion, so further work is required. L. R.

LEFROU (G.). La valeur de la réaction de Vernes péréthynol dans la lèpre. [**Vernes Perethynol Reaction in Leprosy.**—*Bull. Soc. Path. Exot.* 1936. May 13. Vol. 29. No. 5. pp. 464-468.

The author records 188 observations on this test in lepers in Guadeloupe. He came to the conclusion that the flocculation of the serum by the perethynol is completely independent of the leprosy factor, in spite of the fact that protein want of balance may exist in both leprosy and syphilis. This does not make the test useless, for it is important in treatment to know if leprosy is complicated by syphilis. L. R.

PEREIRA (Paulo C. R.). La réaction de fixation du complément avec l'antigène de Witebsky, Klingenstein et Kuhn dans la lèpre. [**Witebsky, Klingenstein and Kahn Tests in Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1936. Apr.-June. Vol. 4. No. 2. pp. 207-214.

The author reports reaction in the blood sera of 107 cases of leprosy. The reaction is a form of complement fixation; first applied by its discoverers to tuberculosis, and later found by BRANTS in Riga and AOKI and MURAO in Japan to be present in a very large proportion of leprosy cases. The antigen is an extract of the tubercle bacillus, for the details of the preparation of which this paper may be consulted. The test proved positive in 100 per cent. of 12 of the cutaneous type, and in 35 mixed cases, as well as in 80 per cent. of 60 neural cases, although it was less strong in the latter. Among 84 sera of persons in continued contact with lepers, mostly children or mates of them, 53 gave negative, 4 doubtful and 27 positive reactions. Of the 27 positive all but 9 were probably leprotic or tuberculous, and the last require to be watched. This test, therefore, gives the highest number of positive reactions in all forms of leprosy of any, so it should be employed in cases of difficult diagnosis and in latent leprosy. L. R.

DUBOIS (A.). La réaction de Mituda. (Notice complémentaire.) [**Mituda's Reaction.**—*Bull. Soc. Path. Exot.* 1936. June 10. Vol. 29. No. 6. pp. 649-651.

The author has obtained very similar results from this test to those of others. Heated and phenolized emulsions of lepromas are injected in 0.5 cc. doses and a papular reaction sought for after 8 to 20 days. The reaction is strongest in normal subjects and in leprosy cases with few bacilli, but negative in those showing many bacilli. The author injected 29 patients with 0.1 cc. intradermally and examined after 10 and 15 to 20 days: he obtained 5 strong, 10 moderate and 7 feeble reactions, but is able to come to no clear decision. L. R.

VAN BREUSEGHEM (R.). Etude de la réaction déterminée par la léprine de Loewenstein chez le lépreux et chez l'homme sain. [**Loewenstein's Leprine Reaction.**—*Ann. Soc. Belge de Méd. Trop.* 1936. Mar. 31. Vol. 16. No. 1. pp. 109-113.

The author has used Loewenstein's leprine in lepers and the healthy by subcutaneous injection; he obtained reactions in 39 per cent. of lepers and in about 62 per cent. of non-lepers. L. R.

FRASER (N. D.). **The Iam Tsau Clinic for Patients suffering from Leprosy.**—*Chinese Med. Jl.* 1936. May. Vol. 50. No. 5. pp. 693–701.

This is an interesting account of a Chinese leprosy clinic founded by a Christian community and partly financed by the patients. It is an early response to recent Canton legislation authorizing the establishment of out-patient and village clinics for the treatment of leprosy patients. The Swatow district is estimated to have 10,000 lepers, and it is hoped that the success of this clinic will lead many more to be opened. At the opening in September 1934, 26 patients attended, at the end of six months 128 had been registered and 99 are attending fairly regularly in spite of some having to come from far, with 50 to 75 per cent. of possible attendances. Neural cases form 50 per cent., and some 29 per cent. are fairly early cases. Alepol and iodized moogrol are used, and some nodular cases responded rapidly to intramuscular and intradermal injections. The cost has been 25 cents. per visit. It is too early to speak of results, but a promising start appears to have been made. L. R.

TOLENTINO (José G.). **Certain Factors supposed to influence the Results of the Treatment of Leprosy.**—*Philippine Jl. Sci.* 1936. Feb. Vol. 59. No. 2. pp. 163–175.

This is a general discussion on the influence certain factors are supposed to have on treatment, based on the records of 477 cases treated at the Eversley Child Treatment Station in the Philippines between 1929 and 1933; apparently the more favourable earlier cases after 788 patients had been sent to the Culion Leper Colony or had died or absconded.

" 1. The effect of certain factors supposed to influence the results of treatment has been studied.

" 2. The severity of skin lesions was found inversely proportional to the percentage of paroled cases.

" 3. The duration of the disease was found to have apparently no relation to the results of treatment.

" 4. The age on admission was found to have a definite relation to the results of the treatment, in that the first, fourth, fifth, and sixth decades gave higher percentages of paroled cases than the other decades. The results, if plotted with age, gave a curve that goes down from the first to the third as the lowest point, gradually rising to the fifth decade as the highest point from which it goes down again.

" 5. The results of the treatment were found to be apparently better among the females than among the males, except in the fifth decade, probably due to the menopause which disturbs the physiological life of the females.

" 6. Contrary to what is commonly claimed, puberty and childbirth did not seem to be important factors in the treatment among these cases.

" 7. The results of treatment were found to be good among the widowed patients, but this is due to the fact that they are generally of mature age and, in the groups studied, there were more females and more of the less-advanced cases than among the unmarried and married cases.

" 8. The degree of nutrition was found to have a definite relation to the results of treatment. The results are inversely proportional to the degree of obesity of the patients. It appears that excess fat in the body has an unfavorable effect on the treatment of leprosy." L. R.

VAN BREUSEGHEM (R.). Essai du 4828 A dans le traitement de la lèpre. [Trial of 4828 A in Leprosy.]—*Ann. Soc. Belge de Méd. Trop.* 1936. Mar. 31. Vol. 16. No. 1. pp. 115–119.

The author reports on eight cases of leprosy treated by an ethyl chaulmoograte of undisclosed composition called 4828 A. It was well tolerated, but without any special activity in the cases dealt with.

L. R.

DELANOE (E.). A propos du traitement mixte de la lèpre. [Mixed Treatment of Leprosy.]—*Bull. Soc. Path. Exot.* 1936. June 10. Vol. 29. No. 6. pp. 641–646.

The author records his experience in treating 150 cases of leprosy for comparatively short periods under favourable hospital conditions. As a result he advises mixed treatment with various combinations of chaulmoogra derivatives, arsenical preparations such as Novarsenobenzol and acetylarsan, B.C.G. Vaccine, solganal B, methylene blue, crisalbine, etc.

L. R.

RYRIE (Gordon A.). The Therapeutic Effects of Phthalic Acid Salts.—*Internat. Jl. Leprosy.* 1936. Apr.–June. Vol. 4. No. 2. pp. 201–206.

A new water soluble salt of phthalic acid, called cotarnine, has been tried in 20 cc. doses of a 1 per cent. solution twice a week in 19 cases; with marked improvement during the first three months only in 9 cases, accompanied by a drop in the sedimentation rate. Three other phthalic acid salts produced no benefit.

L. R.

MONTEL (R.). Conférence sur le traitement de la lèpre par le bleu de méthylène. [Conference on Methylene Blue Treatment.]—*Bull. Soc. Path. Exot.* 1936. Apr. 1. Vol. 29. No. 4. pp. 361–371.
—, BABLET (J.), NGUYEN NGOC NHUAN & DO VAN HOANH. Deux cas de lèpre traités par le bleu de méthylène seul, d'abord, et par l'association: "Bleu de méthylène-chaulmoogra," en suite. Action du traitement sur les symptômes cliniques, sur les tissus et sur le *Mycobacterium leprae*. [Two Cases treated with Methylene Blue.]—*Ibid.* May 13. Vol. 29. No. 5. pp. 560–576. With 10 figs.

The first of these papers records the following results of the treatment of 351 leprosy cases by combined chaulmoogra derivatives and methylene blue.

	Per cent.
Clinically cleared up	10.26
Notably ameliorated	34.76
Ameliorated	45.87
Stationary	6.55
Aggravated	1.42
Died	1.14

The second paper records in detail, with good photos, remarkable improvement in two fairly advanced nodular cases of leprosy, together with microphotos illustrating the tissue reactions.

L. R.

FÉRON. Une indication du bleu de méthylène dans le traitement de la lèpre.—*Bull. Soc. Path. Exot.* 1936. June 10. Vol. 29. No. 6. pp. 646-647.

GRAMBERG (K. P. C. A.). Eenige beschouwingen over de praktijk der leprabehandeling en -bestrijding in N.O.I.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1936. July 7. Vol. 76. No. 27. pp. 1700-1721. English summary.

WATANABE (Yoshimasa). **Experimental Studies on Animals concerning Leprosy. Report VI. Inoculation Tests with Rat Leprosy (Part 2).**—*Kitasato Arch. Experim. Med.* 1936. Apr. Vol. 13. No. 2. pp. 158-168.

The author records attempts to infect guineapigs, rabbits and monkeys by inoculating them subcutaneously and intratesticularly with emulsions of rat leprosy nodules. In the case of guineapigs the results were negative, although the acid-fast organisms may remain alive in their bodies for some time. In rabbits in some instances very mild slightly developed leprosy changes were found at the site of inoculation with retention of the vitality of the bacilli for a time, but it can be said in a general way that normal rabbits are not susceptible to leprosy. In Japanese monkeys none of the animals showed clear evidence of complete infection, although large doses of rat leprosy material may produce temporary leprosy changes containing numerous acid-fast organisms, but the lesions heal readily and spontaneously without leaving any signs of leprosy. L. R.

LAMPE (P. H. J.) & DE MOOR (C. E.). Ratten-Lepra. [**Rat Leprosy.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1936. June 30. Vol. 76. No. 26. pp. 1619-1641. With 3 graphs. English summary.

The authors have made an extensive study of the incidence of rat leprosy in Batavia. Clinically they differentiate between lymphoid and skin leprosy, and found 930 of the former and 225 of the latter per 10,000 rats. The natural infection is a lesion of the subcutaneous lymph glands of the groin, jaw and mesenteric regions, and the bacilli are also regularly found in the skin at the root of the tail. The house rats are most affected. *R. concolor* and *R. norvegicus* suffer more than *R. r. diadeti*. Infection probably occurs chiefly through skin injuries and cannibalism may account for the one-third of the cases in which the jaw and mesenteric lymph nodes are involved. L. R.

PRUDHOMME (R. O.). Le glutathion total dans la lèpre murine. [**Glutathion in Rat Leprosy.**]—*C. R. Soc. Biol.* 1936. Vol. 122. No. 22. pp. 739-741.

The author had previously found a notable diminution of glutathion in severely infected leprosy rats, but normal figures in those slightly attacked. He now reports on the relationship between oxidized and reduced glutathion in infected rats and concludes that although the reduced substance falls in badly involved organs, the pre-existent glutathion is not oxidized but disappears. L. R.

LOBEL (L. W. M.). Büffellepra (Lepra bubalorum). [**Buffalo Leprosy.**—Reprinted from *Handelingen v/h 7de Ned. Ind. Natuurwetenschappelijk.* p. 385.

In buffaloes of the Netherlands Indies (*Bos bubalus* var. *sondaicus*) a skin disease occurs which has not been noticed elsewhere. So far 63 cases have been discovered, distributed as follows: In Java—Semarang 9, Cheribon 7, Serang 5, Batavia 2; in Celebes—Manado 37, Watampone (Makale) 2, Makassar 1.

In Ressorit Paloe (Manado) leprosy of buffaloes is comparatively common. Search is being made in this district for cases in an early stage and to discover, if possible, whether there are any latent cases. At the Seventh Scientific Congress, clinical bacterioscopic and histological pictures of lepra bubalorum were shown on the screen.

H. H. S.

HELMINTHIASIS.

LEIPER (R. T.). **Crustacea as Helminth Intermediaries.**—*Proc. Roy. Soc. Med.* 1936. July. Vol. 29. No. 9. pp. 1073–1074 (Sect. Trop. Dis. & Parasit. pp. 43–44).

A demonstration by microscope and lantern of crustacea as helminth intermediaries.

There is need for regional surveys in the tropics of species of crustacea, specially of the Entomostraca and of the genus *Cyclops*. That *Cucullanus* underwent development in *Cyclops* led LEUCKART to suggest to FEDSCHENKO that *Dracunculus* did so. Of this FEDSCHENKO thought he had got proof, but LEIPER, contrasting the metamorphosed larva of *Dracunculus* which he had himself got in *Cyclops* with that of *Cucullanus* showed the likeness of Fedtschenko's larvae to those of *Cucullanus*. Preparations showed the development of *Gnathostoma spinigerum* in English cyclops. *Cyclops* also harboured parasites of fish and turtle. None of man's trematodes has been shown to develop in *Cyclops*, but the pseudophyllidae need a *Cyclops* species as their first intermediary. No cyclophyllid tapeworm of man makes use of *Cyclops*.

Development of trematodes of man in crustacea is undergone only by *Paragonimus westermanii* in *Malacostraca*. The list of species concerned is:—

"*Astacus* (*Cambaroides*) *japonicus*, *A. (C.) similis*, *A. (C.) dahuricus*, *A. (C.)* sp., *Potamon* (*Geothelphusa*) *dehaani*, *P. (G.) obtusipes*, *P. (Parathelphusa)* *sinensis*, *Pseudothelphusa iturbei*, *Eriocheir sinensis*, *E. japonicus*, *Sesarma dehaani* (experimental: not a food crab)."

In discussion Arthur BLOK asked whether any European fresh-water mollusca acted as hosts of *P. westermanii*; if so the mitten crab, the second intermediary, might have a sinister effect on health in Europe. In replying Professor LEIPER pointed out that mollusca were much more specific as first intermediaries than crustacea as second intermediaries and that none of the first intermediaries had been reported in Europe. He thought that the prohibition of infected Asiatics into the United States had a political rather than a parasitological significance.

Clayton Lane.

PETERS (B. G.). **Some Recent Developments in Helminthology.**—*Proc. Roy. Soc. Med.* 1936. July. Vol. 29. No. 9. pp. 1074–1084 (Sect. Trop. Dis. & Parasit. pp. 44–54). [64 refs.]

A picture of parasitism, as exemplified by cestodes under the heads of life-history anomalies, resistance to digestion, metabolism, immunity and immunological reactions.

The author concludes:—

"They repeatedly follow the complicated routine of their life-cycle, yet depart from it occasionally in an attempted adjustment to abnormal circumstances. They display ingenious processes, physical and chemical, for resisting the digestive ferments of the host and so gain access from the outside world to the host's tissues or intestinal lumen. Once there, they adapt themselves to changed conditions (plentiful food but little oxygen) by assuming an anaerobic mode of life. Then the host intervenes, at least in some somatic infections, by elaborating antibodies which protect it from super-infection. So that, in the end, something like equilibrium between the two is achieved. These antibodies, cautiously used, give the clinician a number of valuable diagnostic techniques.

"The picture is, of course, far from complete even with respect to existing knowledge (it omits particularly the many tissue reactions of the host); and there are extensive areas which cannot yet be filled in. But it is more detailed than would have been possible ten years ago. With further researches into the physiology and immunology of helminthic infections, it is likely that their diagnosis, treatment, and prevention will become increasingly precise and effective."

C. L.

- i. KOMIYA (Yoshitaka), KAWANA (Hiroshi) & TAO (C. S.). **On the Prevalence of Helminthiasis among the Japanese and Chinese in the District of Shanghai. I. Results of Examinations of Helminths Ova among the Chinese Children and Students.**—Reprinted from *Jl. Shanghai Sci. Inst.* 1936. Mar. Sect. IV. Vol. 2. pp. 85–94.
- ii. —, — & —. **II. Results of Examinations of Helminths Ova among the Japanese and Chinese Servants and Cooks in Restaurants and Cafés.**—Reprinted from *Ibid.* Apr. Sect. IV. Vol. 2. pp. 95–107. [32 refs.]
- iii. —, — & —. **III. Results of Examinations of Helminths Ova among the Japanese Primary School Children.**—Reprinted from *Ibid.* May. Sect. IV. Vol. 2. pp. 117–138. [21 refs.]
- iv. —, — & —. **IV. Results of Examinations of Helminths Ova among the Japanese Students of the Girls High School, Commercial School and Tung Wen College.**—Reprinted from *Ibid.* pp. 139–154. [16 refs.]
- v. TAJIMI (Tai). **V. Results of Examinations for Helminths Ova among Japanese Kindergarten Children and their Family Members.** Reprinted from *Ibid.* June. Sect. IV. Vol. 2. pp. 169–183. With 1 plate. [17 refs.]

Helminthiasis in Shanghai as disclosed after examination by a hydrochloric acid, antiformin, ether method. The scope of the different papers is seen in their subtitles.

i. The numbers tested were—in primary schools 55, middle schools 169, Medical College 312. The percentages of infection in the three groups were—ascaris 20, 55, 48, trichuris 11, 37, 37, hookworms, 0, 5, 6, trichostrongylus 0, 1, 1, clonorchis 2, 2, 5, fasciolopsis 0, 2, 1. The figures in papers by other workers in different parts of China are noted and infections with 2 or more sorts of worms are listed.

ii. The numbers tested were—Japanese 109, Chinese 181. The numbers of the two races in whom infection was seen were—ascaris 35, 64, trichuris 57, 94, hookworms 23, 44, threadworms 1, 1, trichostrongylus 1, 1, clonorchis 23, 13, fasciolopsis 0, 2, metagonimus, 2, 0. The distribution is put out in tables by age and sex. As many as 5 infections were present in the same person.

iii. The numbers tested were 2,523. The percentages of infection were—trichuris 37, ascaris 15, hookworms 5, clonorchis 3. There were seen a few infections with enterobius, trichostrongylus, metagonimus and hymenolepis. In about a quarter there was more than one infection. No marked difference in growth was seen in those with or without parasites.

iv. In the faeces of 303 girls the numbers in which eggs were found were—ascaris 71, trichuris 113, hookworms 27, trichostrongylus 3, clonorchis 23, *Hymenolepis nana* 1, total infected 166.

v. The numbers are few but the belief is that infection is likely to be familial with the mother mainly responsible for dissemination. C. L.

ROBERTSON (R. C.). **The Transmission in China of Helminths by Vegetables.**—*Chinese Med. Jl.* 1936. Feb. Supp. No. 1. pp. 418–422. With 10 figs. on 5 plates.

The possibility of contamination of raw vegetables by worm eggs about Shanghai is great.

Vegetables are fertilized by human or animal faeces and they are often washed "in a neighbouring creek or pond where the night soil commodores have been rinsed out in the morning or where the water has been contaminated by sewage in a number of other ways." The deadly effects of heating ascaris eggs are illustrated by microphotographs, but Robertson thinks that the suggestion of heating the fertilizer at the central depot is Utopian. [By natural decomposition, the Beccari process sterilizes by heat even in small quantities and produces a most valuable humus.] C. L.

TAO (C. S.). **Transmission of Helminths Ova by Flies.**—Reprinted from *Jl. Shanghai Sci. Inst.* 1936. Apr. Sect. IV. Vol. 2. pp. 109–116.

Carriage of worm eggs by flies may take place on their legs or in their intestines.

In 64 fly traps, which were emptied in all 189 times, 146,563 flies were caught, 71 per cent. being *Musca*, 13 per cent. *Lucilia* and 16 per cent. *Comptosomyia*. Worm eggs were found in the liquid of the traps in 8 of the 64 places in which they were set—38 eggs in all, and, in detail, 24 ascaris, 6 trichuris and 8 hookworm. Of 206 flies caught near latrines and dissected, 5.8 per cent. had these 3 sorts of eggs in their intestines and none on their legs, but flies fed on parasitic ova do have them on their legs, generally about the "pulvillus." Yet it is thought that the weight of these eggs will make a fly less airworthy so that it cleans these off quickly and so carries them for only a short distance in this way, but takes eggs further afield in its intestine. But, on the other hand, flies pass faeces very soon after taking food [and so probably pass worm-eggs also]. C. L.

CHEN (H. T.). **Parasites in Slaughter Houses in Canton. Part I. Helminths of Kwangtung Hogs.**—*Lingnan Sci. Jl.* (continuation of *Lingnaam Agric. Rev.*) 1936. Vol. 15. No. 1. pp. 31–44. With 17 figs. [16 refs.]

Helminths, seen in 100 slaughtered hogs in Canton, which have the greatest importance for medicine are in order of frequency:—*Ascaris lumbricoides* 40, *Fasciolopsis buski* 26, *Clonorchis sinensis* 1 (in stomach), *Fasciola hepatica* 1. A few *Ancylostoma caninum* were found once in the stomach, and a single sparganum in the intestine taken in with food. C. L.

RYO (Sai). **A Survey of the Distribution of Helminthic and Protozoan Parasites among 10293 Inhabitants of Fushun.**—*Jl. Oriental Med.* 1936. June. Vol. 24. No. 6. [In Japanese pp. 1145–1152. English summary p. 81.]

Parasitic infestation is heavy among the population of Fushun. The subjects examined included all classes—general civil population,

prisoners, mine-labourers, farmers, schoolboys and people attending the outpatient department of the Mukden Medical College. The commonest parasite was *Ascaris*, found in 84 per cent., *Trichuris* next 47·9, *Endolimax* 43·6, hookworm 42·7, the relative proportions of *A. duodenale* and *N. americanus* being nearly 6 to 1. *E. coli* was seen in nearly half (49·4 per cent.), *E. histolytica* in 22·9; the latter was found in 30 per cent. of the Manchurian labourers, 21 per cent. of the general population and 14 per cent. of the schoolboys. *Taenia* occurred in 5 per cent. of Korean schoolboys. Other findings, not numerically stated, were *Trichostrongylus orientalis*, *Strongyloides stercoralis*, *Hymenolepis nana* and *H. diminuta*, *Metagonimus yokogawai*, *Clonorchis sinensis*, *Fasciolopsis buski*, *Dicrocoelium dendriticum*, *Chilomastix* and *Trichomonas*.
H. H. S.

HALL (Maurice C.). **Problems of Parasitism in Hawaii.**—*Rev. Parasit., Clin. y Lab.* Habana. 1936. May–June. Vol. 2. No. 3. pp. 367–383.

After considering the local conditions which do or do not favour parasitism, Hall deals with the parasites, mostly helminthic, of man, poultry, dogs, sheep, goats, cattle and horses as they came to his notice in the course of a month's visit to Hawaii.

As to man's parasites special mention is made of *Fasciola hepatica* with 8 cases known there, of *Trichostrongylus colubrifomis* identified by its eggs, of hookworms of both the common species (conditions being apparently favourable for an attack on this problem), of trichuris which are common and seemingly linked with appendicitis, of threadworms and ascarids whose real incidence is unknown, of *Taenia saginata* and *Hymenolepis nana*, the latter being apparently the commoner, and of amoebae.
C. L.

IGLESIAS (Aurelio Sousa). El parasitismo intestinal en la población escolar de San Ramón y algunas sugerencias de orden profiláctico. [Intestinal Parasitism among School Children of San Ramón, Province of Tarma, Peru.]—*Rev. Méd. Peruana*. 1936. May. Vol. 8. No. 89. pp. 306–316. With 15 figs.

Only those children who had lived for six months at least in the district were examined, but the number was small, 82. Intestinal parasites of one kind or another were found in all. In many the infestation was heavy and three-quarters of them showed multiple parasitism. The commonest was *Trichuris trichiura* in 96·1 per cent., next *Ascaris lumbricoides* 59·4 per cent., then in order *Strongyloides stercoralis* 33·3, *Ancylostoma duodenale* 14·5, *Enterobius vermicularis* 3·1, *Taenia saginata* 2·2, *E. histolytica* 8·3, *Trichomonas* and *Balantidium* each 3·1 per cent. One child harboured *Balantidium*, *E. histolytica*, *Ascaris*, *Ancylostoma* and *Trichuris*.

The causes for so extensive a parasitism are: defaecation anywhere in gardens, fields, cultivated lands; prevalence of flies; absence of protection of food; failure to wear boots; no control of carriers. Mention is made of remedial measures which should be undertaken by the estate officials and by the municipality.
H. H. S.

ARENAS (Rogelio), HERRADA (Manuel) & ALVAREZ (José R.). Valor del examen parasitológico de las heces fecales frente al parasitismo intestinal verminoso revelado por la autopsia. [**Comparison between the Results of Examinations of Faeces and Post-mortem Findings.**—*Rev. Parasit., Clin. y Lab.* Habana. 1936. May-June. Vol. 2. No. 3. pp. 461-467. English summary.

The subjects of these tests were 68 dogs killed by coal gas and the autopsies were performed from 20 minutes to 4 hours after death. The intestine from cardia to anus was removed, the rectal ampulla emptied by pressure and the contents (to correspond with normal faecal excretion) sent to the laboratory for examination in the usual way. The intestine was then laid open and examined for worms. The greatest discrepancies were found as regards *Dipylidium*. These were not found in any of the faecal examinations but were seen in 38 at the autopsy; by the latter *Ancylostoma* was seen in 42, in the faeces 43 times; *Trichuris* was found 3 times at autopsy, 4 times in faeces. With *ascaris* again there was marked difference—3 positive by faeces and 12 by autopsy. Once only was *Diphyllbothrium* found, but this was seen by both methods. In the article protocols give the findings of single infestations and the various combinations of them. [It would make an interesting study to carry out an analogous investigation in man, comparing the findings of ova during life or, as above, in the faeces soon after death and those revealed by autopsy.] H. H. S.

HINMAN (E. Harold) & BAKER (D. D.). Helminthological Survey of 1,315 Dogs from New Orleans with Special Reference to Age-Resistance.—*Jl. Trop. Med. & Hyg.* 1936. May 1. Vol. 39. No. 9. pp. 101-104. [20 refs.]

SOUTHERN RHODESIA. ANNUAL REPORT OF THE PUBLIC HEALTH LABORATORY AND PASTEUR INSTITUTE [1935-36] [BLACKIE (W. K.), Director]. **The Pulmonary Manifestations of Bilharzia Disease** p. 9. **The Definitive Sites of *B. haematobium* in the Pelvis** p. 9.

The distribution of *Schistosoma haematobium* in the body is wide.

At autopsy the eggs were seen in nearly every case in the lungs, with typical miliary nodules and an X-ray picture which may be like that of pulmonary tuberculosis; and as to the pelvis with few eggs in the bladder there may be many in the Fallopian tubes, while the prostate, seminal vesicles and lower parts of the ureters are common sites.

C. L.

DAY (H. B.) & KENAWY (M. R.). **A Case of Bilharzial Myelitis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. July 31. Vol. 30. No. 2. pp. 223-224. With 1 fig.

The boy of ten died with complete paralysis of legs, anaesthesia of legs spreading to the trunk, incontinence of urine and faeces, bed sores, septic parotitis, pyaemia.

In the lumbar enlargement of the spinal cord were small necrotic areas. Under the microscope in the grey matter and just behind the anterior horns were ova of *S. haematobium* with granulation tissue

round them. Nerve cells near the ova were more or less degenerating with disappearing dendrons and dissolution of Nissl's granules and nuclei; the others were normal. There was no sign of infection in urinary or alimentary tracts and no worms were seen in the portal vein.

C. L.

LE GAC (P.), ESPIAN (M.) & RARIVOSON (A.). A propos d'un cas de bilharziose vésicale autochtone. [**An Indigenous Case of Urinary Schistosomiasis (in Madagascar).**].—*Bull. Soc. Path. Exot.* 1936. Apr. 1. Vol. 29. No. 4. pp. 431–432.

This, it is believed, is the first case of infection with *S. haematobium* in one who has never left Madagascar.

C. L.

CAWSTON (F. Gordon). **The Lithium Salts of Antimony in Bilharzia Infection.**—*Prescriber.* 1936. July. Vol. 30. No. 7. pp. 233–234.

Anthiomaline has advantages in the treatment of schistosomiasis.

Lithium antimony-thiomalate is very soluble, stable in the dark and below 80°C., contains 16 per cent. of antimony, its low toxicity may be due to sulphur in the molecule, it is clear when in solution, an advantage in being certain of entry into a vein in intravenous injection. In the ampoules supplied were 2 cc. of a 6 per cent. solution or 0.01 gm. of antimony. The doses are 0.5 cc. for the first to a child of 12, and 1.5 cc. for the others. The repeated adult dose should not be more than 4 cc., otherwise there will be salivation and retching. In this there is less than half the quantity of antimony than in the repeated dose of tartar emetic but dead eggs are sooner passed with anthiomaline. Four injections a week may be given till this condition is present, which is in about a month sooner than with tartar emetic, though the drug has had to be given for 6 or 7 weeks. A permanent cure has been got after less than 0.5 gm. of antimony.

C. L.

PIÉRI (J.) & SARDON. A propos d'un cas de bilharziose vésicale traité par le 110 L (antimoniothiomalate de lithium). [**A Case of Bilharziasis treated with Lithium Antimoniothiomalate.**].—*Bull. Soc. Path. Exot.* 1936. May 13. Vol. 29. No. 5. pp. 508–513.

Treatment was successful in a child of 12 in doses of 1 and 2 cc. and thereafter of 3 cc. twice a week to a total of 30 cc. [Although only a single instance is reported, it is noted here in order to call attention to a new drug and its dosage.]

C. L.

BACCHELLI (Giulio). Sul primo caso di Bilharziosi intestinale da *Schi. mansoni* osservato nella Somalia Italiana. [**The First Case of *S. mansoni* Infestation recorded in Italian Somaliland.**].—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1936. Apr. Vol. 17. No. 4. pp. 206–208.

An Arab had eggs of *S. mansoni* in the faeces, the first case seen in Italian Somaliland. He had come there from Yemen, Arabia, 6 months earlier, and the belief is that he had got his infection in Yemen [see this *Bulletin*, 1936, Vol. 33, pp. 11 and 14.].

C. L.

SATTA (Ernesto). Identificazione del primo focolaio di "Bilharziosi intestinale" da *Sch. mansoni* nella Colonia Eritrea. [**A Focus of *S. mansoni* Infestation in Eritrea.**—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1936. Apr. Vol. 17. No. 4. pp. 193-205. With 5 figs. & 1 map. [22 refs.]

A case of Mansonian schistosomiasis infected in Eritrea.

An Italian, after a year in Eritrea, had a bath in a pool of the fast mountain stream, Dadda, got pruritus all over the body 10 hours later, and in 35 days fever and dysentery. There were eggs of *S. mansoni* in the faeces. In that stream *Planorbis boissyi asmarica* n. var. was present. Satta makes the statement that in his review of the literature of January, 1936 [this *Bulletin*, 1936, Vol. 33, pp. 1-15] LANE says that *S. mansoni* does not exist in Eritrea, Ethiopia, or French or English Somaliland [the words used were that from these places "No accounts have come to light," a very different thing], and makes the point that GIROLAMI had collected cases in the Italian literature from Eritrea [see this *Bulletin*, 1936, Vol. 33, p. 553]. [The writer's intention to make clear the gaps which there are in the records has, then, had a quick and fruitful result.]

C. L.

FARGES. Sur quelques foyers de bilharzioses en Côte d'Ivoire. [**Foal of Schistosomiasis on the Ivory Coast.**—*Ann. de Méd. et de Pharm. Colon.* 1936. Apr.-May-June. Vol. 34. No. 2. pp. 384-387.

The subject of the title of this paper is mainly of local importance only. The author finds, however, that anthiomaline is of equal value to tartar emetic, blood ceasing to be present in the urine after 0.2 gm.; it is remarkably well tolerated, and is easily given subcutaneously or intramuscularly, a point of importance in treating children and where injections are given by the unskilled.

C. L.

KHALIL (M.) & AZIM (M. Abdel). **An Epidemic-like Increase of Mortality due to Intestinal Schistosomiasis in an Egyptian Village.**—*Jl. Egyptian Med. Assoc.* 1936. Aug. Vol. 19. No. 8. pp. 475-495. With 8 graphs, 3 maps & 2 figs.

In the village of Tanan, 25 km. to the north east of Cairo and with about 9,000 inhabitants, there took place in the autumn of 1934 and again of 1935 an unexplained rise in the death rate in men only. The symptoms were those of dysentery, debility, anaemia with haemoglobin down to 20 or 30, and eosinophilia. Malaria parasites were absent, microfilariae were present in 8 per cent. and enlarged spleen and liver in 5 per cent. When death took place it did so in 2 to about 24 months. In one girl who died there were many worms in subperitoneal nodules, such as are seen only in heavily infected animals. There were some worms in abdominal lymph glands and living eggs in liver and pancreas. From examination of urine and faeces of 396 inhabitants 55 per cent. showed eggs of *S. haematobium* (in males 86 per cent., in females 24 per cent.), while 59 per cent. showed those of *S. mansoni* (in males 59 per cent., in females 31 per cent.). The canal running through the village was piled with refuse and dead dogs. The mosque sewer opens into it and the mosque latrines are used very freely by those living near. *Physa acuta* and *Planorbis boissyi* are many and large in this canal. A scheme is on foot for a new irrigation canal to take the place of this

foul one and for the permanent closure of the mosque latrines. [The "Contents" of the journal are in error in attributing this paper to Khalil alone.] C. L.

TRIM (E. A.). **Schistosomal Cirrhosis and Splenomegaly in the Central Kavirondo District of Kenya Colony.**—*East African Med. J.* 1936. Aug. Vol. 13. No. 5. pp. 130-141. With 3 figs. on 1 plate. [30 refs.]

Cirrhosis of liver, generally with splenomegaly, is present in more than 1 per cent. of inpatients in the native hospital, Kisumu; all of them lived where *S. mansoni* is prevalent and in half of them the eggs of the parasite were seen. The changes in blood, spleen and liver were like those of schistosomiasis, in fact they are cases of "Egyptian splenomegaly." C. L.

RODRIGUEZ-MOLINA (R.). **Schistosomiasis mansoni, Cirrhosis of the Liver with Splenomegaly and Macrocytic Anemia.**—*Bol. Asoc. Med. Puerto Rico.* 1936. June. Vol. 28. No. 6. pp. 119-120.

RODRIGUEZ-MOLINA (R.). **Anemia in Schistosomiasis Mansoni and its Treatment in Puerto Rico.**—*Bol. Asoc. Med. de Puerto Rico.* 1936. July. Vol. 28. No. 7. pp. 146-151.

A study of the blood in 20 cases of Mansonian schistosomiasis.

The blood was taken from a vein, 3 cc. being kept liquid by the addition of 6 mgm. of dry potassium oxalate, and 100 per cent. Hb. being taken as that present when there were 14.5 gm. in 100 cc. of blood. One case was seen in the first or toxæmic stage with red cells 5,460,000, Hb. 83, mean corpuscular Hb. 22 micro-micrograms (slightly below normal), mean corpuscular volume normal. In the second diarrhoeic stage 8 were seen; red cells 3,400,000 to 4,900,000, Hb. 55 to 110, the blood hypochromic microcytic in 5, normocytic in 3, the anaemia responded to iron and ammonium citrate 2 to 6 gm. daily, but neither foudain nor liver extract had any influence. In the third visceral stage 11 were seen, in 6 the anaemia was macrocytic, in 3 microcytic, in 2 normocytic, the red cells were from 1,360,000 to 3,960,000, Hb. 30 to 100. In the 5 macrocytic cases there had been hæmorrhage from the bowel and in one hæmatemesis, and it is a microcytic anaemia which goes with loss of blood, and this microcytic anaemia "seems to fit in with the clinical picture of cirrhosis of the liver, splenomegaly and anaemia encountered in Banti's syndrome. . . Can the macrocytic anaemia . . . in the late stages of schistosomiasis be considered as an indication of liver dysfunction?" In two cases splenectomy has been followed by marked clinical improvement. C. L.

ERRATUM.—Vol. 33. No. 7. RODRIGUEZ MOLINA & PONS summary pp. 555-556, 15th line from top of p. 556 for 'by the "specific antianaemic factor"' read 'of the "specific antianaemic factor"'.

GIOVANNOLA (Arnaldo). **Specific Action of Some Drugs on Experimental Infections of *Schistosoma mansoni*.**—*Amer. J. Hyg.* 1936. July. Vol. 24. No. 1. pp. 102-108.

Tartar emetic proved the best drug for the killing of schistosomes in experimental conditions.

The test animals were rabbits in 3 series, the last two having controls showing that 43 and 147 worms became parasites. They were infected either by dropping the same quantity of the same cercarial suspension on to the shaved abdomen or by being put with shaved abdomen in the same infective bath. They were then given a curative drug. After tartar emetic given intravenously in a 6 per cent. solution to a total of 75 mgm. in doses of 15 mgm. every other day, no living flukes were present; after acriflavine (2 per cent. in water freshly made and put into the stomach by tube in quantities of 40 mgm. on alternate days to a total of 200 mgm.) there were present "about 100," 36 and 73; after emetine hydrochloride injected intramuscularly in 4 per cent. solution on alternate days in doses of 10 mgm. (total 30 mgm.) or 5 mgm. (total 25 mgm.) the living worms numbered 12, "not done," and 6; after fouadin injected intramuscularly in 2 injections of 0.25 cc. and 7 of 0.5 cc. there were in the first series "about 200" and in the second 40 worms; after acriflavine by mouth (40 mgm. every other day and 200 mgm. in all) the surviving worms were "about 100," 36 and 73. "Fouadin did not show a specific action . . . Acriflavine was without use. . . . Emetin hydrochloride had some action . . . especially when given in smaller doses." None of the drugs prevented infection when given previous to it. C. L.

CAWSTON (F. Gordon). **The Duration of Treatment for Bilharziasis.**—*Jl. Trop. Med. & Hyg.* 1936. Sept. 15. Vol. 39. No. 18. pp. 212-213.

The comparatively large doses of tartar emetic given to children without ill effects should be got into a period of a month. *S. mansoni* infections need special care and attention. A patient given 40 cc. of anthiomaline has put on 7 lb. in 6 months and remains free from signs of infection. Boys of 8 and 10 have needed 30 cc. of the drug in a month to bring about cessation of passage of eggs. But in one such child a rise in eosinophils from 8 to 29 per cent. after treatment suggests care in pronouncing cure till these cells become normal in numbers. C. L.

GIOVANNOLA (Arnaldo). Unisexual Infection with *Schistosoma mansoni*.—*Jl. Parasitology.* 1936. June Vol. 22 No. 3 pp. 289-290 With 1 fig.

GIOVANNOLA (Arnaldo). Comparative Action of Tartar Emetic and Fouadin on *Schistosoma mansoni* in vitro.—*Jl. Parasitology* 1936. June. Vol. 22. No. 3. pp. 302-303.

BINDRA (B. S.). The Treatment of Schistosomiasis Extract from Thesis on "*Schistosoma japonicum*, and the Problem of Schistosomiasis in India."—*Jl. Trop. Med & Hyg.* 1936. Aug. 1 & 15. Vol 39. Nos. 15 & 16. pp. 175-179; 185-190. [88 refs.]

KAN (Huai-Chieh) & KUNG (Jen-Chu). Incidence of Schistosomiasis Japonica in an Endemic Area in Chekiang.—*Chinese Med. Jl.* 1936. Feb. Supp. No. 1. pp. 449-456. With 3 figs & 1 sketch map.

SPIRIDION (J. T.). Schistosomiasis Japonica: an Account of an Outbreak. —*Jl. Trop. Med. & Hyg.* 1936. July 15. Vol. 39. No. 14. pp. 161-164. [15 refs.]

CAWSTON (F. Gordon). Destruction of the Bilharzia Parasites of Man.—*Jl. Trop. Med. & Hyg.* 1936. July 1. Vol. 39. No. 13. pp. 150–152.

WATT (John Yin Chieh). Study on the Bionomics of the Intermediate Host of *Schistosoma japonicum* in Kutang, Chekiang, 1934–35.—*Chinese Med. Jl.* 1936. Feb. Supp. No. 1. pp. 434–441. With 1 map & 1 chart.

The bionomics of *Oncomelania* snails were studied for a full year. Their habitats varied with season, hibernation in earth taking place in winter. The highest percentage infection rates of 16,501 snails were—in March (3.18) and September (3.4), the mean for all months being 1.28. Breeding takes place about May and September. C. L.

EDGAR (W. H.). Report on a Case of Epilepsy due to Infection by the *Schistosomum japonicum*.—*Jl. Roy. Nav. Med. Serv.* 1936. Apr. Vol. 22. No. 2. pp. 150–153.

Epileptiform convulsions, preceded by closing in of the right side of the field of vision, some worsening of sight, and an occasional fumbling for the right word, a paracentral scotoma in the right inferior temporal quadrant, and some aching on the left parietal bone led to operations which displayed under this bone a sharply outlined spherical yellowish tumour an inch in diameter which was pronounced "to consist of the ova of *S. japonicum*." A month later the condition was much improved. C. L.

KAN (Huai-Chieh). Intracutaneous Test with *Schistosoma japonicum* Antigen. (A Preliminary Report.)—*Chinese Med. Jl.* 1936. Feb. Supp. No. 1. pp. 387–393.

"Preparation of Antigen.—The antigens which were used were prepared as follows: Adult *Schistosoma japonicum* were obtained from experimentally infected rabbits. *Taenia crassicolis* or *Clonorchis sinensis*, which were used as the control antigens, were obtained from infected animals. The helminths were washed with saline and dried in a desiccator. The dry helminths were then powdered and for one week extracted in a shaking machine with 1/10 normal sodium carbonate solution containing 1 per cent. phenol, using 100 parts of phenolized sodium carbonate solution to 1 part of the dry powder. The suspensions were separated by being centrifuged at a speed of 3,000 r.p.m. for 30 min. One part of the supernatant fluid was then diluted with 31 parts of normal saline, thus giving a concentration of 1 part of dried powder in 3,200 parts of diluents. This has been found to be satisfactory.

"The phenolized saline for control was prepared by adding $\frac{1}{4}$ cc. of phenol to 100 cc. of normal saline."

The following is the author's summary of tests made with this antigen:—

"(1) Intracutaneous injections of *Schistosoma japonicum* antigen were given to 624 persons, using *Taenia* or *Clonorchis* antigen and phenolized saline as the controls.

"(2) Of the 101 females tested, 26 were positive to the test.

"(3) Of the 523 males tested, 397 were positive to the test.

"(4) Of the 423 persons in the positive group, 89.4 per cent. resided in the endemic regions.

" (5) In 48.6 per cent. of the cases in the positive group the result of this test agreed with the findings of the physical examination.

" (6) In 60.4 per cent. of the cases in the positive group results of this test agreed with those of the faecal examinations." C. L.

i. KHALIL (M.). **Individual Variation in the Excretion of Drugs as an Important Factor in their Therapeutic Results. A Practical Method for detecting the Schistosomiasis Cases with So-called Idiosyncrasy to Antimony to avoid Fatalities and Complication.**—*Jl. Egyptian Med. Assoc.* 1936. June. Vol. 19. No. 6. pp. 285–305. (No. 8. pp. 502–510. Discussion.)

ii. —. **Excretion of Drugs : Its Influence on Therapeutic Results with Special Reference to the Antimony Treatment of Schistosomiasis.**—*Lancet.* 1936. July 18. p. 132.

i. Persons vary much in their rate of excretion of antimony (and arsenic). Those whose excretion is quick are resistant to treatment with the drug and have to be given a series of courses. Those whose excretion is slow are liable to poisoning whose end may be death. Those with a mean rate are cured normally.

Of 1,938 cases of schistosomiasis treated with fouadin 53 per cent. were cured after 9 injections, 21 after 11, 6.6 after 13, 3.4 after more than 13, and 16 gave up treatment. About 1 per cent. were intolerant of the drug and 0.2 per cent. died suddenly. "Most of these cases are never reported in Egypt." Relapses took place in 33 per cent. of cases. The hypothesis is put forward that "the facts known can be all explained on the basis that individuals vary in their power of excretion of antimony from their bodies." Fouadin is a solution of a compound of antimony and pyrocatechin. The test used is for pyrocatechin in the urine and is this. To 5 cc. of clear urine add 5 cc. of a fresh 0.05 per cent. FeCl_3 solution. After shaking add 1 cc. of a strong ammonia solution and shake. The colour, at first green, changes to violet and then red with the strong alkali. The reaction can be brought about with ferrous salts and so is not due to catechol. The colour begins to be seen in some persons 15 minutes after an intramuscular injection of fouadin, in others there is none even after 24 hours, in the normal case it is seen after 3 hours. "The delay in excretion corresponds to the kidney efficiency as tested by the urea concentration test and blood urea. Cases that excrete fouadin quickly need more injections to get cured. . . . The intensity of the reaction corresponds roughly to the amount of antimony excreted judging by the stain on the copper foil of the Reinsch's test." As to treatment "The correct way is to calculate the dose according to the amount retained in the body for a reasonable time. This can only be done by quantitative estimation of the amount excreted within a few hours and this is the aim we are at present trying to attain."

As to the Egyptian problem : at an estimate there are 10 million cases of schistosomiasis, about one million take treatment every year, 2,000 of them are killed by antimony. This "fouadin tolerance test" may be used as a kidney efficiency test.

Pages 502–510 contain a discussion by 9 persons on the paper just summarized. GUINENA asked whether there were cases of catechol retention with ordinary urinary findings ; Khalil in answer said that there were such cases with apparently normal kidneys ; "this agrees however with the result of the urea concentration tests when done on

the same cases." ABDEL SHAFIE MOHAMED spoke of two cases noted by Khalil with renal tumours and slow excretion of the drug; since these tumours are rarely bilateral and the good kidney is normal or hypertrophied there should not be retention of the drug. Again, to settle the question of excretion, parallel tests should be made on blood and urine. In reply Khalil said that in them there was a high blood urea and "disturbance of the urea concentration test"; no tests had been made for antimony in the blood.

MAKAR said that in chronic infection of the bladder, specially with carcinoma, there were living ova. "It is well known that the kidneys of such patients are usually in an advanced stage of disease" nor could he agree to use a dangerous test for kidney function when there were safe ones to hand, for "cases with dormant uraemia are waiting for such indiscretion to have their fate sealed. Besides the drug which in scientific hands may be safely used as germicidal, is apt in the hands of less conscientious persons to become homicidal." Khalil replied that there was nothing to show that cases of bilharzial cancer were resistant to treatment; that the test depends not on antimony but on pyrocatechin disulphonate of sodium and that deaths from the drug take place only after 6 or more injections.

I. R. FAHMY pointed out that the excretion of antimony continues after that of catechol ends and that so long as we are without knowledge of the rate of decomposition of catechol or fouadin in the body it is better to use a direct test for antimony than an indirect one for catechol. ALI HASSAN, too, pointed out that antimony may be found in the urine without the organic fouadin radicle, and questioned the attribution of death to the kidneys in a child mentioned in whom no lesions worth noting were found in them. To them Khalil replied that the test must be a simple one as this is, and that the results of the fouadin tolerance test and that for antimony corresponded "exactly." "The rate of antimony excretion, however, goes on much more slowly than that of the pyrocatechol radicle."

AMIN SABRI pointed out that, whatever might be said of antimony, cases have died from a first or second injection of 0.15 gm. of salvarsan or neosalvarsan. Khalil said in reply that the drug must have been impure.

SMIRK pointed out that the tests advised were not quantitative as they should be.

MAHMOND BEY MAHER dwelt on the medico-legal aspects of these deaths.

ii. Covers a part of the first paper.

C. L.

MOULINARD (M.) *Traitement de la bilharziose par l'anthiomaline. Résultats comparés à ceux obtenus avec l'émétine et l'émétique. [Anthiomaline compared with Emetine and Tartar Emetic in the Treatment of Schistosomiasis].—Ann. de Méd. et de Pharm. Colon.* 1936. Apr.-May-June. Vol. 34. No. 2. pp. 352-371.

Anthiomaline is a better drug against schistosomes than emetine or tartar emetic.

Eight cases were treated with each drug. The daily and total doses given to boys of 12 to 14 were—for emetine 0.04 and 0.6 gm., for tartar emetic 0.08 and 1.2, and for anthiomaline 0.12 (0.06 on the first day) and 1.38 gm. The mean cures per cent. at the end of treatment and some months later were, as judged by eggs—for emetine 62.5 and 12.5,

for tartar emetic 75 and 25·0, and for anthiomaline 100 and 85·7. To the last there was seen no contraindication, the injections were not painful, there was no local or general reaction, and no evidence of renal damage. C. L.

RICHET (Pierre). Auto-observation d'un cas de bilharziose vésicale et de son traitement par différents composés stibies. [**Antimony Compounds in the Treatment of Urinary Schistosomiasis.**]—*Ann. de Méd. et de Pharm. Colon.* 1936. Apr.–May–June. Vol. 34. No. 2. pp. 372–383.

Anthiomaline has given the author the best results in his own person.

A chronic infection needs chronic treatment. Malefern, bismuth, emetine and the arsenicals are absolutely useless. Antimony is not strictly a specific, the most active antimonials are fouadin and anthiomaline. C. L.

ROBERTSON (R. C.). **The Breeding Conditions of *Oncomelania hupensis* (Rissoidae : Triculinae).**—*Lingnan Sci. Jl.* (continuation of *Lingnaam Agric. Rev.*). 1936. Vol. 15. No. 1. pp. 55–56. With 3 plates.

“ It appears to us from the evidence collected so far that schistosomiasis is not likely to be contracted after the end of September and that mollusks are relatively free from infection until the end of the breeding season in the following spring.” C. L.

CAWSTON (F. G.). The Local Application of New Remedies for Bilharziasis. [Correspondence.]—*South African Med. Jl.* 1936. Apr. 11. Vol. 10. No. 7. pp. 277–278.

YAWS AND SYPHILIS.

SAUNDERS (George M.), KUMM (Henry W.) & RERRIE (James I.).
The Relationship of Certain Environmental Factors to the Distribution of Yaws in Jamaica.—*Amer. Jl. Hyg.* 1936. May. Vol. 23. No. 3. pp. 558-579. With 6 maps. [14 refs.]

In this article are detailed the results of studies and observations (conducted with the support and under the auspices of the International Health Division of the Rockefeller Foundation and the Government of Jamaica) upon the present distribution of yaws in Jamaica as it is related to the environmental factors of rainfall, geology, topography, the presence of *Hippelates* flies, etc.

Though the disease has the opportunity of spreading to every part of the island as infective cases are constantly being introduced into all areas, yaws is localized in Jamaica to certain sharply delimited areas, thus suggesting that certain factors limit the spread of the disease and others favour its propagation. The results to date cannot be better expressed than in the authors' own words :—

"Rainfall seems to have an important influence on the prevalence of yaws, although we cannot be certain whether it affects the disease directly, causing more infectious lesions to appear, or whether it is important indirectly in that it favors a dense vegetation. This in turn might affect distribution by providing suitable breeding places for insect vectors, by increasing the likelihood of injuries to the lower legs and feet, where the primary yaws lesion nearly always appears, or by maintaining the viability of the infecting organism outside the body. The underlying geological formation seems to be an important factor, for wherever we find porous white limestone there is little or no yaws. This may be because the ground dries very rapidly in such places and because there is usually a poor surface soil and scant vegetation. On the other hand, in most places where there is a relatively impervious formation, with productive soil, ample precipitation, and a jungle type of flora, yaws is common. Altitude seems to have little direct effect, for we find yaws at all elevations where there is a country peasant type of population. It may, however, have an indirect influence, because precipitation tends to be greater over hills than over low-lying plains. The sanitary status of the country peasant is essentially the same throughout the island ; but in districts where yaws is found, the disease is commonest among the lowest social orders. In fact, it may be said categorically from our experience that yaws almost never occurs among the upper classes and that a low standard of living is essential to the prevalence of the disease. Villages and towns always show less yaws than the surrounding country. This may be due to the presence of a slightly higher social order in the town or to a scantier vegetation. Wherever there is much yaws, *H. pallipes* flies are found in abundance ; and as a rule the opposite is true, although there are places where these flies are found in great numbers and where the disease is absent. Also, in comparing the incidence of yaws with the fly catch in adjoining urban and rural districts we find that, although the disease is much commoner in rural parts, the fly catch is essentially the same as in the urban parts. We cannot yet decide whether the distribution of *H. pallipes* in Jamaica determines the distribution of yaws, or whether both are affected by the same environmental factors, causing their distribution to coincide."

H. S. Stannus.

KUMM (Henry W.). **The Jamaican Species of *Hippelates* and *Oscinella* (Diptera, Chloropidae).**—*Bull. Entom. Res.* 1936. July. Vol. 27. Pt. 2. pp. 307–329. With 6 figs. & 1 plate. [16 refs.]

The author has focussed attention on these flies because they are the insects which were found in greatest abundance feeding on the ulcers of yaws, and are possibly important as vectors. There are fifteen species of Chloropidae in Jamaica, of which *Hippelates pallipes* Loew., is the most widely spread and abundant. The distribution of all the species in the island is described in detail and a key with clear explanatory diagrams for identification is given. V. B. Wigglesworth.

KUMM (Henry W.). The Natural Infection of *Hippelates pallipes* Loew with the Spirochaetes of Yaws.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. Nov. 25. Vol. 29. No. 3. pp. 265–272. With 1 chart & 3 figs. on 2 plates.

KUMM (Henry W.) & TURNER (Thomas B.). **The Transmission of Yaws from Man to Rabbits by an Insect Vector, *Hippelates pallipes* Loew.**—*Amer. Jl. Trop. Med.* 1936. May. Vol. 16. No. 3. pp. 245–271. With 5 plates. [17 refs.]

A paper detailing the first successful transmissions of yaws to rabbits by means of *Hippelates* flies.

Treponemata are found in large numbers in the oesophagus of this fly after an infecting meal but they diminish rapidly so that none are found after 48 hours. There is no evidence of invasion of the salivary glands or proboscis, nor of cyclical development, nor of contamination of the legs. On the other hand it was found that this fly repeatedly regurgitates "vomit drops" containing treponemata during some hours after feeding. This appears to be the probable mode of transmission from patient to wound on the second subject. In the experimental work flies were allowed to feed alternately on a yaws lesion and then either on a granulating wound on the back of a rabbit or on a freshly scarified area on the scrotum. In other cases the inoculum consisted of the dissected out infected oesophageal diverticula.

It was found that the scrotum site was the more easily infected and it was also discovered that inoculations made in the winter, with removal of the animals from Kingston to New York for the incubation period were the more successful. [A very interesting point in experimental work.] H. S. S.

CHENOY (C. F.), SIDDIQUI (M. Ahsan) & ABRAHAM (A. C.). **Investigation of Yaws (Koya Disease) in Warangal.**—*Indian Med. Gaz.* 1936. June. Vol. 71. No. 6. pp. 322–326. With 1 map.

Yaws has generally been considered to be very rare in India. The discovery of the disease in the Warangal district is therefore of considerable interest. So far in the state of Hyderabad it has been found confined to the jungle tract to the east (between the Mungeru river and the Kodavari). It is believed, however, by the authors that yaws may also exist on the other side of the Kodavari, in the East Godavari area and in the Chanda forest. [It would seem not improbable that yaws will be found much more widely distributed in India than has been supposed, when search is made among other primitive forest tribes.]

Persons of all ages were found to be suffering from the affection, the incidence being estimated at 5 per cent. Gonds and Dorras, primitive tribes of Dravidian origin, formed the bulk of the sick. They are spoken of as a semi-starved people wearing only a loin-cloth, who huddle together in their huts for warmth. They are, however, of cleanly habits in regard to their houses and persons. They believe that infection results from contact but blame the red ant as playing some part. They say that "Mothers suffering from 'Koya' (yaws) never have given birth to a child suffering from the disease."

[From the clinical description given there is little doubt that the disease is framboesia though the descriptive terms used would appear to be sometimes rather loose.]

Sabre-tibia is not an uncommon affection, gangosa occurs and mention is made of a case with ulceration of the forehead and necrosis of the frontal bone. No cases exhibiting lesions of the mucous membranes were seen and no mention is made of J.A.N. or goundou. H. S. S.

HACKETT (Cecil J.). **A Critical Survey of Some References to Syphilis and Yaws among the Australian Aborigines.**—*Med. Jl. Australia*. 1936. May 30. 23rd Year. Vol. 1. No. 22. pp. 733-745. [51 refs.]

In this paper the author gives a critical review of all or nearly all that has been written upon the occurrence of syphilis and yaws in the Australian aborigines. It is for this reason impossible to summarize and Dr. Hackett's conclusions only will be given. He suggests that the references made by the older writers to venereal disease probably all refer to yaws and not syphilis, granuloma pudendi being excluded. He believes that when Australia was discovered by Europeans yaws was prevalent in all communities and that this disease persists among them so long as they are not divorced from their bush fashion of life. Yaws is endemic in the Northern Territory and in Central Australia in areas where syphilis is unknown. H. S. S.

HACKETT (Cecil J.). **Boomerang Legs and Yaws in Australian Aborigines.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1936. July 31. Vol. 30. No. 2. pp. 137-143. With 1 map & 4 figs. on 2 plates. [19 refs.]

A very interesting paper dealing with the condition, which in Australia has been referred to as boomerang leg, its relation to yaws and their distribution in that continent.

The author has shown that among the aborigines of the centre of Australia there is a widespread disease known to them as *irkinija* which he has identified as yaws. The disease is contracted in infancy or early childhood, lasts a certain time and then clears up. After a quiescent period of some years pains in the shins develop and the tibiae become bent, with the production of boomerang leg, practically always before puberty. Actual full blown cases of yaws were not seen but the association of the scars of the disease with the characteristic tibial deformation was a very close one. These scars are identical with those produced by yaws in the Northern Territories where yaws is well recognized and in the areas investigated syphilis is unknown.

The evolution of the pathological process is traced and Dr. Hackett makes references to some other bony changes which he thinks may be due to yaws including changes in the skull.

The high incidence of boomerang leg was remarkable and in the discussion some speakers suggested that a second factor might be involved. Diseased bones had been collected from widely separated areas in Australia and arguing from this Dr. Hackett suggested that in the past yaws had been widely diffused over Australia and had occurred among native groups living in non-tropical climates. In discussion it was pointed out that tropical and non-tropical climates must be differentiated from the climates within and without the geographical tropics.

H. S. S.

LAMBERT (S. M.). A Yaws Campaign and an Epidemic of Poliomyelitis in Western Samoa.—*Jl. Trop. Med. & Hyg.* 1936. Feb. 15. Vol. 39. No. 4. pp. 41-46.

ALFREDO FAHSEN (V.). Contribución al estudio del pian en Guatemala. [**Yaws in Guatemala.**] [Thesis presented to the Faculty of Medical Sciences, National University, Guatemala 1933, Feb.]—44 pp. With 3 figs. 1935. Guatemala: Tipograf. Sánchez & de Guise.

This is a graduation thesis and has the usual characters of works of that kind. The present might have been applied to the disease in any locality for it contains no figures regarding local prevalence, in fact the only reference to Guatemala may be summed up in the conclusion that "Yaws exists in Guatemala, is endemic in a certain district, Chocoma in the Suchitepéquez department, and has probably been so for many years." The description is divided into sections dealing with the geographical distribution, the spirochaete, its staining and cultivation, experimental inoculation in monkeys, the pathological anatomy, symptoms, prognosis and treatment. One looks in vain for a reasoned discussion of the unicist and dualist sides of the question of yaws and syphilis. The time-honoured list of text-book differences is given, and a repetition of the statements that yaws does not affect mucosa or viscera, etc.—each a mere *petitio principii*. The one difference which we have not seen stressed before is that in the discharge from yaws lesions the spirochaetes are numerous, 6-8 per field, which is not the case with syphilis—an unsafe guide [the micro-photograph reproduced shows three]. There are notes of 6 cases and an appended bibliography showing the sources from which most of the statements have been culled.

H. H. S.

VAN DER SCHAAR (P. J.). De liquor cerebrospinalis bij lijders aan framboesia tropica. [**The Cerebrospinal Fluid in Tropical Yaws.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1936. Mar. 31. Vol. 76. No. 13. pp. 784-804. [16 refs.]

A total of 129 cases was subjected to examination and care was taken to avoid the inclusion of cases of syphilis, by attention to the history of the patient and any venereal lesions which he might carry. In 90 cases the cerebrospinal fluid showed no evidence of deviation from normal, while in 28 cases (24 per cent.) there was some indication of change. Positive Wassermann and Sachs-Georgi reactions can occur. More frequent was the finding of a positive protein reaction. Pleocytosis

was also included as a definite change in the condition of the cerebro-spinal fluid. One of the most noteworthy results of the research was that no change could ever be found in the fluid during the secondary or papular stage of the disease. This is significantly the stage where no doubt can exist as to the diagnosis between yaws and syphilis.

W. F. Harvey.

CARMAN (John A.). **A Case of Simultaneous Infection with Yaws and Primary Syphilis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1935. Nov. 25. Vol. 29. No. 3. pp. 261–263.

The title of this article might suggest that the patient contracted both yaws and syphilis at the same time but in truth it is the report of the case of an East African native who developed yaws in April in his native village, contracted syphilis after intercourse with a native prostitute in Nairobi in the beginning of December. The evidence of yaws was a typical generalized granulomatous eruption; the evidence of syphilis was an indurated spirochaete-positive penile ulcer with generalized enlargement of lymphatic glands.

Dr. J. H. SEQUEIRA who saw the case stated that while on the one hand the chancre was syphilitic without possible doubt, the granulomatous eruption was typical of yaws and never reproduced in syphilis.

H. S. S.

WILLIAMS (Herbert U.). **Pathology of Yaws. Especially the Relation of Yaws to Syphilis.**—*Arch. Pathology.* 1935. Oct. Vol. 20. No. 4. pp. 596–630. With 12 figs. [80 refs.]

This article forms a very readable general review of yaws from the pathological aspect but contains no original contribution to our knowledge of the disease nor any facts not already known to readers of this *Bulletin*, while the author's conclusions differ hardly at all from those expressed from time to time by the reviewer.

H. S. S.

ASENCIO (Fernando). **Juxta Articular Nodules. Syphilitic Case Report and Review of Literature.**—*Bol. Asoc. Med. de Puerto Rico.* 1936. May. Vol. 28. No. 5. pp. 99–102. With 4 figs. [14 refs.]

An account of a case of J.A.N. of 17 years standing in a 56-year-old Wassermann positive, male, white Porto Rican who had had syphilis at the age of 29. Nodules were present over each ulnar crest and a number were also present in both buttocks. Some account is given of the histo-pathological picture. This purports to be the first case of J.A.N. to be reported from Porto Rico.

H. S. S.

BREIJER (H. B. G.), ELSBACH (E. M.) & HERMANS (E. H.). **Nodosités juxta-articulaires. [Juxta-articular Nodules.]**—*Nederl. Tijdschr. v. Geneesk.* 1936. Mar. 14. Vol. 80. No. 11. pp. 1100–1105. French summary (5 lines).

These juxta-articular nodules develop in the subcutaneous tissue and exhibit three zones microscopically—a fibrous peripheral zone, a middle zone with young connective tissue cells, infiltration cells and macrophages, and an innermost zone, which may be hyaline or necrotic. The authors examined 1,450 Indonesians of the personnel of the Rotterdam Lloyd, of whom about 60 per cent. were Madoerese and about 40

per cent. Javans, with the result that nodules were found in 2.2 per cent. of the former and only 0.7 of the latter. A therapeutic test with neosalvarsan or neosalvarsan and bismuth caused the nodules slowly but surely to disappear. Microscopic examination of excised nodules, however, did not settle satisfactorily whether these nodules were due to yaws, syphilis or to some allied affection and the examination of spirochaetes in sections was inconclusive.

W. F. Harvey.

NISHIYAMA (K.) & NAGAHAMA (M.). Ueber die Nodosités juxta-articulaires Jeanselme bei den Japanern mit besonderer Berücksichtigung des Röntgenbildes. [**Juxta-Articular Nodules in the Japanese.**]—*Japanese Jl. Dermat. & Urol.* 1936. Feb. Vol. 39. No. 2. [In Japanese pp. 152–165. With 15 figs. [15 refs.] German summary pp. 17–18.]

Two cases are recorded. The first, a girl of 9½ years, living near Osaka, had suffered for 3 years from “rheumatic pains in the joints.” Examination showed numerous swellings to the size of a walnut, the smallest being as large as a pea, situated on the extensor aspect of both wrists, along the forearms, on the dorsum of the right foot and the sole of the left. They were cystic and on puncture a greyish milky fluid was obtained in small amount, containing cholesterin, lime and phosphate. [Some at least of these, e.g., those along the bones of the forearm would seem to be true rheumatic nodes.]

The second was a man of 52 years who had served in the Russo-Japanese war, but for three years had lived mainly near Osaka. He had suffered for 18 years from joint and tendon pains. The nodes in his case were largely about the joints—the carpal joints, elbow, knee and hip, and at the insertion of the left tendo Achillis. They varied in size from a bean to a “nut,” though they felt cystic nothing was obtained on puncture. Wassermann and Meinicke reactions were negative in both cases. [From the general description and also from the situation, these nodules should more likely be regarded as rheumatic or some of them perhaps as ganglia, rather than J.A.N. as named in the title. There was no history of yaws and the tests for syphilis were negative.]

H. H. S.

NICOLETTI (Ferdinando). Su di un'atipica elaiopatia provocata. Contributo alla conoscenza dell'autolesionismo in infortunistica. [**Lesion Artificially Produced by Injection of Oil.**]—*Riv. Sanitaria Siciliana.* 1935. June 1. Vol. 23. No. 11. pp. 819–822, 825–827. With 2 figs. [12 refs.] French summary (7 lines). [Summary appears also in *Bulletin of Hygiene.*]

The subject of this narrative was a bricklayer and mason, aged 26 years, who slipped and struck his right knee. The joint swelled and he was treated in hospital and kept under observation for 3 months. After another 3 months he again presented himself with four fairly distinct swellings about the right patella, the largest having a diameter of 5½ cm., with connexion with the overlying skin but slightly moveable on the subjacent tissues. Flexion of the knee was reduced to an angle of 125°, but was overcome by passive movement. The swellings were thought at first to be fibro-sarcomata or bursal inflammatory effusions as sequelae of the injury. The patient stated they had developed quite rapidly. Suspicion, however, was aroused and a needle inserted ;

an oily fluid was withdrawn which on examination, chemically and by the Wood light, proved to be vaseline.

The case is related here because of the similarity of the condition to juxta-articular nodules. H. H. S.

PLANTILLA (Fidel C.) & MABALAY (Epifanio). Gangosa—a Clinical and Histologic Study of an Extensive Case.—*Monthly Bull. Bureau of Health*. Manila. 1935. Oct. Vol. 15. No. 10. pp. 367–371. With 2 figs.

This case is published on account of the extensive nature of the lesion and at the same time to report the pathological findings. It is one, however, easily counterparted in any country where gangosa occurs; the pathological picture is normal for the condition. H. S. S.

ESSED (W. F. R.). De oudste beschrijvingen van den rhinopharyngitis mutilans, tevens een historisch bewijs, dat deze aandoening van framboetischen en niet van luetischen aard is. [**The Oldest Descriptions of Rhinopharyngitis Mutilans and a Historical Proof that this is Yaws and not Syphilis.**]—Reprinted from *Feestbundel 1936 v.h. Geneesk. Tijdschr. v. Nederl.-Indië*. pp. 563–578. With 4 figs. on 2 plates. [23 refs.]

The author regards the condition known as rhinopharyngitis mutilans or gangosa as a framboesia disease. Almost all of the article is occupied with setting forth his interesting views on the relations of framboesia (yaws) to syphilis. These centre mainly round the question whether the epidemic syphilis of the fifteenth century was, in reality, yaws and was a Spanish disease introduced by the early sailors from America. The author's work on the "Source of Syphilis" gives a greater wealth of detail than does this pamphlet. (See this *Bulletin*, 1934, Vol. 31, p. 221.) W. F. Harvey.

RAMOS E SILVA (J.). Ainhum e bouba. [**Ainhum and Yaws.**]—*Hospital*. Rio de Janeiro. 1936. Aug. Vol. 8. No. 8. pp. 833–840. With 3 figs. [10 refs.] French summary.

After a brief review of the literature on ainhum in Brazil the author describes the case of a man of 41 years with this condition affecting the fourth toe of the left foot. The patient stated that it had started 4 years previously, contemporaneously with certain lesions of the sole, which the author describes as identical with keratoderma punctatum seen in the Philippines and the Netherlands Indies and believed to be yaws. This patient had suffered from yaws at the age of 7 years. The author is of opinion that these are not merely coincident lesions, but suggests that they are connected aetiologically; his reasons being that yaws and ainhum often occur together in natives, and that in Brazil decline in one has been associated with decline in the other. [Without further evidence, these reasons are not very convincing.]

H. H. S.

HUDSON (Ellis H.). Hyperkeratoses and Depigmentations in Bejel.—*Ann. Trop. Med. & Parasit.* 1936. Apr. 8. Vol. 30. No. 1. pp. 3–10. With 2 plates. [12 refs.]

The previous paper by this author on "Bejel" or endemic child syphilis of the middle Euphrates area was reviewed in this *Bulletin*,

1935, Vol. 32, p. 891. In the present communication he adds short notes with excellent photographs upon two conditions which up to date have been thought to be characteristic of yaws. The one is characterized by thickening and fissuring of the skin of the soles of the feet at points bearing the weight of the body and the heel: the second is a patchy depigmentation of the skin of the hands. Both have been previously noted by LACAPÈRE in Moroccan syphilis. As regards the first condition the author recalls BLACKLOCK's remark that probably if natives who contracted syphilis in childhood and went about barefooted were observed they would be found to exhibit this plantar lesion which had been held to be characteristic of yaws. In the Euphrates region the condition is very common, all are said to have had bejel and all have positive Kahn reactions. [The actual proof that the condition is due to Bejel is of course wanting and Hudson notes that a girl aged 6 had a similar fissuring dermatitis on the hands and arms but the observation is of very great interest.]

The second condition is equally interesting and as far as one can judge from the photographs the lesions on the hands certainly resemble very closely those which have been considered to be due to yaws. In neither case have they been proved to be due to Bejel and yaws respectively but again the observation is a most interesting one. The skin of the depigmented areas in Bejel is said to be otherwise normal and it is stated that occasionally the process involves the skin of the whole body producing a piebald condition. [As far as I am aware this more generalized form has never been recorded in yaws, whereas in yaws when the hands (and wrists) are affected the feet and ankles are also generally the seat of similar lesions. One is left in doubt whether the piebald condition is in fact of the same nature as that seen in the hands; non-syphilitic vitiligo or leucoderma is not rare in coloured races. It is to be hoped that further observations of as precise a character as possible, will be forthcoming.]

H. S. S.

TURNER (Thomas B.). **The Resistance of Yaws and Syphilis Patients to Reinoculation with Yaws Spirochetes.**—*Amer. J. Hyg.* 1936. May. Vol. 23. No. 3. pp. 431–448. [17 refs.]

Experiments are recorded in which yaws and syphilis patients were inoculated intracutaneously with living yaws spirochaetes, which in most instances were shown to be virulent for man. The inoculum consisted of 0.1 to 0.2 cc. serum from a secondary yaws lesion shown to contain active *T. pertenue* by dark ground illumination; control inoculation consisted in the use of 0.1 per cent. formalized serum obtained in the same way; both injections made into the skin of the thigh or back. Subjects examined within 48 hours after inoculation, at weekly intervals during the incubation period and thereafter at 2-weekly intervals for at least 3 months. Development of a yaws lesion was considered a positive result, failure of a lesion to appear was considered indicative of immunity. In some cases confirmation of positive result undertaken by dark-ground examination. In rare instances pyogenic lesions were noted a few days after inoculation.

Eighteen patients with yaws, from 2 to 11 years of age, whose infection has been present for from 1 week to 7 years were inoculated from their own lesions. Results all negative except in a single case who had had yaws for 5 months and who presented a profuse eruption and bony lesions.

Six of this series were inoculated with heterologous spirochaetes at the same time. Two yielded positive results among those who were negative to autoinoculation. Conclusion—Resistance to autoinoculation develops early and persists while active yaws lesions are present.

Sixty-seven yaws patients were inoculated with heterologous strains of yaws spirochaetes with the following results :—

Duration of first infection in years	No. of patients	Results			
		Positive		Negative	
		Number	Per cent.	Number	Per cent.
Less than 1 ...	16	12	75.0	4	25.0
1 to 3 ...	14	10	71.5	4	28.5
3 to 8 ...	18	8	44.4	10	55.6
10 to 65 ...	19	3	15.8	16	84.2

Conclusion—Immunity develops to heterologous strains of spirochaetes: the immunity varies according to the duration of the natural first infection. Several years may elapse before patients become refractory to this second inoculation. It was also shown that among this same group of 26 patients with *active* lesions 57.7 per cent. were refractory; of 23 to whom treatment had been given and in whom the disease had been latent for less than 1 year 17.4 only were immune; of 18 in whom latency had obtained for 2 years or more 83.3 per cent. were immune, the latent stage having been preserved in some naturally, in others in consequence of treatment.

Conclusion—The development of immunity is retarded by treatment which interrupts the normal course of the disease.

The types of lesion produced by inoculation were of two kinds :— (a) proliferative: either a single large framboesiform papule always containing spirochaetes or a collection of folliculo-papules with scanty organisms; (b) destructive: when no spirochaetes were found. There was no definite correlation between the type of lesion present in the naturally occurring disease and that produced by inoculation.

Conclusion—the current theory that destructive or gummatous-like lesions are due to a changed reactivity of the body tissues must be accepted with caution.

The incubation period on inoculation of 33 persons was from 13 to 84 days. In 27 the incubation period was under 6 weeks: in 11, inoculated with virus from a single case, the lesion appeared in 6 in the 3rd week, 3 in 4th week, 2 in 5th week.

Ten persons with latent syphilis in whom the diagnosis seems fairly assured were inoculated with *T. pertenue* shown to be virulent for man. The result was negative in all.

Three groups of patients comprising respectively (a) 10 with yaws of less than 3 years duration, (b) 10 with yaws of 10 years duration or more, and (c) 10 with latent syphilis were inoculated with the same testicular emulsion prepared from rabbits with yaws, adequate controls being used. Ten per cent. only of (a) were immune, 80 per cent. of (b), and 100 per cent. of (c).

It is suggested that successive crops of lesions which are commonly seen in yaws might be due to reinfections, a point of importance in the interpretation of the results of treatment.

It is pointed out that reliable information concerning cross immunity of the yaws patient to syphilis is not forthcoming and that even though many persons contract yaws in childhood their relatively susceptible period to syphilis may extend well beyond the adolescent years, so that caution must be observed in assigning *T. pertenue* as the aetiological agent in the case of syphilis-like lesions of the cardio-vascular and nervous systems. In the individual case, perhaps the most reliable method of arriving at a correct aetiological diagnosis is by recovery through rabbit inoculation of the one or the other treponema, with its characteristic disease picture, from the lymph nodes or other organs of the affected person. H. S. S.

SERRA (G.). Le salicylate de bismuth dans la thérapeutique du pian. [**Bismuth Salicylate in Treatment of Yaws.**—*Bull. Méd. du Katanga*. 1935. Vol. 12. No. 5. pp. 189, 191-7, 199-200.]

An article dealing with the method of preparation, mode of employment and advantages of bismuth salicylate in the treatment of yaws. 100 gm. bismuth salicylate after complete drying by heat for two or three hours are triturated in a mortar with 1 litre of ground-nut oil added slowly till a fine emulsion results; this is then kept for 15-20 minutes on a water-bath with the water boiling, after which 10 gm. guaiacol is added. The dosage recommended is: 1 cc. per 10 kilo body weight intramuscularly into the buttock once a month for three to four months or 1 cc. per 15 kilo body weight once a week for five weeks. The injection is fairly painless, no toxic effects were seen, early lesions disappear quickly, it is cheap. Such a course of treatment, however, cannot be looked upon as curative. H. S. S.

GOTAY (José B.), COSTA MANDRY (O.) & PAYNE (George C.). **The Intensive Method of Control applied to Yaws. A Preliminary Report.**—*Puerto Rico Jl. Public Health & Trop. Med.* 1935. Sept. Vol. 11. No. 1. pp. 91-101. With 4 figs. on 2 plates. [Spanish version pp. 102-113.]

A description of the results obtained by an intensive method of anti-yaws campaign.

In opening, reference is made to the history of the disease in the island of Porto Rico. Introduced with negro slaves during the second and third decade of the 16th century it remained a widespread infection until slave trading was discontinued in 1865, after which the disease rapidly declined and thereafter appeared only in small localized endemic foci scattered throughout the island.

In 1902-03 there was noted an epidemic among school children in the N.W. corner of the island which was mistaken for syphilis and treated apparently with success with mercury and potassium iodide but from 1903 to 1917 nothing further was reported. In 1917, however, cases were again noted and in 1931 an outbreak was signalled which forms the subject of this communication.

The intensive method of control consisted in:—(a) A reconnaissance by a sanitary inspector in order to delimit the affected zone. (b) A census of the total population of that zone with notification of all cases

and of those with suggestive histories. (c) The summoning of all those notified to a treatment centre. (d) Re-examination of the population at intervals.

The area involved was some 4 to 5 square miles in extent ; the total population numbered 1,091. Ninety-four cases of yaws and 34 persons with a suspicious history were found. Of the former 78·2 per cent. yielded positive W.R., of the latter 10·5 per cent. For comparison 517 members of an unselected population were examined serologically and 411 found to be negative.

Treatment consisted in series of injections of 0·6 gm. N.A.B. Re-examination of these patients three years later revealed that 56·9 per cent. still gave positive W.R., *i.e.*, over 50 per cent., notwithstanding the disappearance of clinical manifestations. The figures did not differ much among those who had had 12 or more treatments or among those who had had fewer treatments.

H. S. S.

REVIEWS AND NOTICES.

TOPLEY (W. W. C.) [M.A., M.D., M.Sc., F.R.C.P., F.R.S., Professor of Bacteriology & Immunology, University of London, Director of the Division of Bacteriology & Immunology, London School of Hygiene & Tropical Medicine] & WILSON (G. S.) [M.D., F.R.C.P., D.P.H., Professor of Bacteriology as Applied to Hygiene, University of London, London School of Hygiene & Tropical Medicine]. **The Principles of Bacteriology and Immunity.** 2nd Edition.—pp. xv+1645. With 276 figs. 1936. London: Edward Arnold & Co. [50s.] [Review appears also in *Bulletin of Hygiene*.]

The appearance of a new and extensively revised edition of Topley and Wilson's "Principles of Bacteriology and Immunity" may be hailed as something of an "event" in the world of bacteriology, pathology and hygiene. The book is sufficiently well known to professional bacteriologists that they will need no instigation to procure the new edition, but as it is yet a comparatively new work it may not be out of place to refer to some of the qualities which recommend it to a more extended circle of readers. It may be described (in its present form) as a one-volume system of bacteriology, and the authors have wisely realized that while some parts of the subject are best reduced to a synopsis, there are others which call for continuous and logical development. The very full and explicit descriptions of the various species of bacteria are particularly well given and obviously incorporate the results of much independent study. On the other hand, the chapters on immunity, which closely follow the treatment given in Professor Topley's "Outline of Immunity," are without doubt one of the best accounts of the subject ever written. As a pioneer educational work and as a synthesis of contemporary bacteriological thought it is difficult to overpraise the book but it would be a mistake to regard it as purely theoretical. From beginning to end the practical and in particular the hygienic aspects of the subject are most thoroughly treated, and we know of nowhere where the wheat of bacteriological and immunological applications has been so thoroughly sifted from the chaff. Its compendiousness, comprehensiveness and accuracy make this the almost ideal book for the shelves of the M.O.H. or indeed of any practitioner in medicine who is interested in one of the most progressive of the medical sciences. To the isolated worker, in the tropics or elsewhere, the book is a godsend for it is a first-class book of reference and at the same time provides opportunities for much fascinating continuous reading. We wish the authors of this excellent work long success and many future editions, but when we contemplate the immense pains which must go to maintain it at its present splendid standard we wonder if the wish is really a kind one.

C. C. Okell.

SOCIEDAD ARGENTINA PATOLOGIA REGIONAL DEL NORTE. **Novena Reunión. . . . celebrada en Mendoza 1, 2, 3 y 4 de octubre de 1935. En homenaje a la memoria de Carlos Chagas. Primer Tomo. Enfermedad de Chagas.** [Report of Ninth Congress of Northern Argentine Pathological Society. Special Chagas Memorial Number.]—pp. vi+568. With numerous illustrations. 1936. Buenos Aires: Imprenta de la Universidad.

This volume of between 500 and 600 pages is a memorial work to Professor Carlos CHAGAS and consists of 42 papers by various authors,

all dealing with some aspect of American trypanosomiasis, Chagas's disease. Most of them, of course, cover the now familiar ground, recording clinical cases, finding of cases in fresh districts, animal hosts, pathogeny of the infection and so on, subjects which have received ample notice in the *Bulletin* during the past 20 years. One or two outstanding articles merit more than such passing reference here. First, one by Dr. Evandro CHAGAS on Experimental Infection of Man by the Trypanosome. He shows that infection by bite, if it occurs at all, must be very exceptional, in fact he is of opinion that the only mode worth attention is that of inoculation of the gut contents. Next Dr. Salvador MAZZA stresses once more the value of Romaña's sign, unilateral palpebral oedema, as diagnostic of the disease in its early stage, and the same author has studied the presence of natural infection of dogs and cats. Together with MIYARA, SALOMON and SANJURJO, MAZZA has investigated domestic animals and wild mammals in the environs of Mendoza as carriers of *T. cruzi*. Of the latter he names the following Edentata: *Chaetophractus vellerosus vellerosus*, *Chaetophractus vellerosus pannosus*, *Dasybus novemcinctus novemcinctus*, *Zoedys pichycaurinus*; of the Marsupialia: *Didelphis paraguayensis* and *Lutreolina crasicaudata paranaensis*; Cheiroptera (bats): *Nyctinomus macrotis* and *Myotis levis*; Canidae: *Pseudalopex culpaeus culpaeus*; Mustelidae: *Grissonella ratellina*. Of these, the last two of the edentata, and those belonging to the last three groups—Cheiroptera, Canidae and Mustelidae—were all determined in 1935.

The work will not only prove a noteworthy memorial to Carlos CHAGAS, but is useful as a compendium for reference. H. H. S.

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The bracketed abbreviations after the page numbers indicate the subjects.
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Am. signifies Amoebiasis and Amoebic
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Bb. " Beriberi and Epidemic Dropsy.
Bl. " Blackwater.
B.R. " Book Review.
Chl. " Cholera.
C.Bu. " Climatic Bubo and Lympho-
granuloma Inguinale.
Der. " Tropical Dermatology.
Diet. " Deficiency Diseases.
Dys. " Dysentery (Bacillary and
Unclassed).
Fev. " Fevers.
Hel. " Helminthiasis.
Hist. " Historical.
H.S. " Heat Stroke.
K.A. " Kala Azar.

Lep. signifies Leprosy.
Lept. " Leptospirosis.
Mal. " Malaria.
Misc. " Miscellaneous.
Oph. " Tropical Ophthalmology.
Pel. " Pellagra.
Pl. " Plague.
Rab. " Rabies.
R.B.F. " Rat-Bite Fever.
R.F. " Relapsing Fever and other
Spirochaetoses.
Sn. " Venomous Snakes and Snake
Venoms.
Sp. " Sprue.
S.S. " Sleeping Sickness.
Y.F. " Yellow Fever.
Y. & S. " Yaws and Syphilis.

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 Colas-Belcour, J., 55 (R.F.)
 —, with Roubaud, 653 (S.S.)
 —, — & Treillard, 288 (Mal.)
 Cole, A. F., 699 (R.B.F.)
 Coles, A. C., 691 (R.F.)
 Collier, W. A. & Krause, M., 192 (S.S.)
 Collignon, E., 244 bis, 263 (Mal.)
 Colonial Development Fund (Malaria Research Scheme), 225 (Mal.)
 Comaroff, R., with Kligler, 205 (S.S.)
 Compagnini, G., (272) (Mal.)
 Congo Belge, 645 (S.S.)
 Connell, F. H., 527 (Am.)
 Connery, J. E., with Goldwater, Steinberg & Most, 122 (Hel.)
 Connor, F. P., 127 (Hel.)
 Constantinesco, N., with Balteanu, 920 *quat.*, 921 (Fev.)
 —, with Ciunca & Balteanu, 36, 925 bis (Fev.)
 Cook, S. S., with Riley & Faust, 280 (Mal.)
 Cooley, R. A., with Kohls, 693 (R.F.)
 Copanaris, P., 18 (K.A.)
 Copeland, A. J., (291) (Mal.)
 Coria, N. A., with Glaser, 711 (Dys.)
 Cormack, R. P., 465 (Misc.)
 —, with Carman, 793 (Mal.)
 Corman, A., 524 (Bl.)
 Corradetti, A., 712 (Dys.), 806 (Misc.), 857 (Mal.)
 Corsi, E. M., with Mazza, (678) (S.S.)
 Corson, J. F., 649, 651, 667 (S.S.)
 Cort, W. W., 554 (Hel.)
 — & Talbot, S. B., 554 (Hel.)
 Costadoni, A., 267 (Mal.)
 Costa Mandry, O., with Gotay & Payne, 969 (Y. & S.)
 Costanzi, C., (921) (Fev.)
 Cottrell, H. B., with Keller, Googe, Miller, Jr., & Harvey, 583 (Hel.)
 Coutelen, F., 134, 563 (Hel.)
 Covell, G., 226 (Mal.), 419, 910 (Fev.)
 — & Baily, J. D., (260) (Mal.)
 —, — & Vidya Prasad, 226 (Mal.)
 — & Mehta, D. R., 909 (Fev.)
 Cowdry, E. V. & Heimbürger, L. F., 301 (Lep.)
 —, — & Williams, P. S., 605 (Lep.)
 Craig, C. F., 280 (Mal.), 526 (Am.)
 Crainz, F., with Marchesi & Scapatucci, 18, 508 (K.A.)
 Crimmins, M. L., with Peck & Erf, 395 (Sn.)
 Cross, S. X., with Herrick, 669 (S.S.)
 Crougue, O., with Chorine, 940 (Lep.)
 Crowder, J. A., with Anderson, Newman & Stodola, 940 (Lep.)
 Cruveilhier, L., with Lépine, 317 (Rab.)
 —, Truche, C. & Viala, C., 746 (Rab.)
 Cruz, W. O., 585 (Hel.)
 Cuenca, H., (678) (S.S.)
 Culbertson, J. T., 184 (S S), 485 (Misc.)
 Cullen, T., 432 (Fev.)
 Culpin, M., 72 (Misc.)
 da Cunha, A. M., 428 (Fev.)
 Cunningham, J. & Fraser, A. G. L., 54 (R.F.)
 Curran, E. J., 431 (Fev.)
 Cuypers, H., with Beerens, 389 (Sn.)

D.

- Dale, W. C., 680 (Misc.)
 Daleas, P., 228 (Mal.)
 — & Lavergne, J., 783 (Mal.)
 Dalrymple-Champneys, W., with Briercliffe, Wigglesworth & others, 679 (Mal.)
 Dang, J. M. L., 101 (Hel.)
 Dang, M. G., Hemenway, R. V. & Lau, S., (777) (Mal.)
 Dang-Hanh-Kien, 524 (Bl.)
 Danzel, L. A., (371) (Pl.)
 Darder, E. & Meneu, A., 431 (Fev.)
 Darré, H. & Mollaret, P., 619 (Y.F.)
 Darriba, A. R., 595 (Hel.)
 Das Gupta, B. M., with Knowles & Sen, 700 (R.B.F.)
 Das Gupta, C. R., with Napier, 803 (Misc.)
 Datta, S. K., with Banerjee, 378 (Chl.)
 Daufresne, M., with Vinzent & Seguin, 692 (R.F.)
 Davey, J. B., 654 (S.S.)
 Davey, T. H., with Findlay, 615 (Y.F.)
 —, with —, Stefanopoulo & Mahaffy, 339 (Y.F.)
 —, with Gordon, 514 (Bl.)
 David, N. A., with Rosen & Martin, 545 (Am.)
 Davies, W. M., 637 (Misc.)
 Dawson, W. T., Gingrich, W. & Hollar, E. D., 272 (Mal.)
 Day, H. B. & Kenawy, M. R., 951 (Hel.)
 Day, L. F., 776 (Mal.)
 De M. N. & Chatterjee, K., 407, 408 (Diet.)
 De, N. N., with Chopra & Chowhan, 389 (Sn.)
 Dearborn, F. E., 249 (Mal.)
 Debbasch, G., Calo, A. & Burgarella, M., (839) (Mal.)
 Decourt, P., 789 (Mal.)
 —, Villain, G., Marini, C. & Dupoux, R., 797 (Mal.)
 Defries, R. D. & Campbell, T. C., 744 (Rab.)
 Degotte, J., with Dubois, 303 (Lep.)
 De la Barrera, J. M., 362 (Pl.)
 — & Riesel, M., 362 (Pl.)
 Delanoë, E., 157 (Misc.), 449 (Oph.), 944 (Lep.)
 Delbet, P., 597 (Hel.)
 Delbove, P., with Ragiot, 38, 39 (Fev.)
 — with —, Nguyen-van-Huong & Ho-thieu-Ngan, 354 (Lept.), 433 (Fev.)
 Del Frade, A., with Kouri, 87 (Hel.)
 Del Rosario, F., with King, 853 (Mal.)
 —, with Tubangui, Basaca & Pasco, 582 (Hel.)
 Del Toro Cano, F., 599 (Lep.)
 Delville, J. P., 435 *ter* (Fev.)
 Demidowa, L. W., 237 (Mal.)
 Demjashev, M., with Fenjuk, 872 (Pl.)
 Dendale, R., with Fabiani, 24 (K.A.), 535 (Am.)
 Denning, G. M., with Wigmore, 354 (Lept.)
 Dennis, E. W., with Turner & Berberian, 101, (564), (Hel.)
 De Rivas, G. T., with Johnson, 675 (S.S.)
 Dervillée, P., (587) (Hel.)
 Deschiens, R., 532 (Am.)
 —, with Dopter, 531 (Am.)
 Des Essarts, J. Q., & Lefrou, G., 298 (Lep.)
 — with —, 606, 936 (Lep.)
 Despujols, B. P., 761 (Mal.)
 Deutsch, V., with Levaditi, 57 (R.F.)
 Dévé, F., with Blanco & Capurro, 564 (Hel.)
 Devignat, R., (875) (Pl.)
 Dew, H. R., 100 (Hel.)
 Dey, N. C., with Acton, 143 (Der.)
 Dhar, J., 77, 479 (Misc.)
 Diaz Martin, L., 590 (Hel.)
 Dibold, H., 712 (Dys.)
 Diboll, C. G., with Faust, 280 (Mal.)
 Dick, J. C., (565) (Hel.)
 Dickson, R. M., 219 (Mal.)
 Dierick, J. E. A. M., 806 (Misc.)
 Diethelm, O. A., with Hughes & Tebbutt, 914 (Fev.)
 Dimitrijević-Speth, V., 35 (Fev.)
 Dimitriu, C. C. & Popovici, A., 265 (Mal.)
 Dixon, D. S., with Walker, 638 (Misc.)
 Dixon, H. B. F. & Smithers, D. W., 102 (Hel.)
 Djohan, B., with de Langen, 409 (Diet.)
 Dodd, M. C., with Gruhzt, Lindsay & Hendricks, 673 (S.S.)
 Doderio, J., with Genevray, 321 (Rab.)
 —, with —, Gaschen & Autret, 489 (Misc.)
 Dodge, C. W., 570 (B.R.)
 Dogra, J. R. & Ahern, D. M., 103 (Hel.)
 Donatien, A. & Lestoquard, F., 20 *bis* (K.A.), 46 (Fev.), 925 (Fev.)
 —, with —, 507 (K.A.)
 Doorenbos, W., 375, 376 (Chl.)
 Dopter, C. & Deschiens, R., 531 (Am.)
 Dorolle, P. & Ngo-quang-Ly, 309 (Lep.)
 —, Huynh-van-Huy & Tran-van-Tam, 612 (Lep.)
 Dostrovsky, A., 21 (K.A.)
 Dostrowsky, A., 297 (Lep.)
 Doull, J. A., Rodriguez, J. N., Guinto, R. & Plantilla, F. C., 931 (Lep.)
 Do van Hoanh, with Montel, Babet & Nguyen Ngoc Nguan, 944 (Lep.)
 —, with —, Le-van-Phung, Nguyen-van-Khai, Tran-van-Hanh, Truong-van-Que & Nguyen-ngoc-Nhuan, 309 (Lep.)
 Dreessen, W. C., with Williams, 344, 345 (Y.F.)
 Drinker, C. K., with Augustine, 595 (Hel.)
 —, — & Leigh, O. C., 129 (Hel.)
 Driollet, E., with Mazza, 211 (S.S.)
 Drummond, R., (232) (Mal.)
 Dubois, A., 298, 309, 942 (Lep.)
 — & Degotte, J., 303 (Lep.)
 —, with Gavrilov, 610 (Lep.)
 — & Noël, G., 439 (Fev.)
 Dubreuil, J., with Le Chuiton, Mondon, Berge & Pennanéac'h, 438 (Fev.)
 Dufour, J., with Nattan-Larrier, 506 (K.A.)
 Duggan, J. N. & Nanavati, B. P., 903 (Oph.)
 Duke, H. L., 179, 196, 207, 645, 652, 657 (S.S.)
 — & Mellanby, K., 652 (S.S.)
 Dunham, G. C., (600) (Lep.)
 Dupoux, R., with Decourt, Villain & Marini, 797 (Mal.)

Dupoux, R., with Villain, 782 *bis* (Mal.)
 Dupuy, 646 (S.S.)
 Durand, R. & Bonneau, E., 615 (Y.F.)
 —, with Laigret, 427 (Fev.)
 Durieux, C., 915 (Fev.)
 —, with Mathis & Advier, 340 (Y.F.)
 Du Soleil, G., with Houssiau, 156 (Misc.)
 Du Toit, P. J., 668 (S.S.), 749 (Rab.)
 Dutrénit, J., with Sabrazès, Lannelongue & Bonnel, 353 (Lept.)
 Duverger, M., with Fourrier & Genova, 500 (K.A.)
 Dyckerhoff, H., 547 (Am.)
 Dyer, R. E., with Bengston, 441 (Fev.)
 Dyke, H. W., 763 (Mal.)
 Dzen, M. Y. & Yu, H., 867 (Chl.)

E.

Earle, W. C., Palacios, L. D. & Arbona, A., 837 (Mal.)
 Eddie, B., with Meyer, 871 (Pl.)
 Edgar, W. H., 956 (Hel.)
 Edney, J. M., with Nolf, 122 (Hel.)
 Egan, C. H., 553 (Hel.)
 Egypt, 452 (Oph.)
 Ejercito, A., (761) 774 (Mal.)
 El-Biblawi, A., 544 (Am.)
 Elisei, C., with Purcaro, 529 (Am.)
 Ellison, F. O'B., 683 (Mal.)
 El Salam, A. A., 95 (Hel.)
 Elsbach, E. M., with Breijer & Hermans, 964 (Y. & S.)
 Emmons, C. W., with Carrión, 472 (Misc.)
 d'Empaire, J. R. H., (576) (Hel.)
 Enneking, J. A. M. J., 69 (Sp.)
 Epstein, E., 543 (Am.)
 Epstein, G. W., & Silvers, I. L., 919 (Fev.)
 —, — & Exemplarskaya, E. V., 919 (Fev.)
 Erber, B., 354 (Lept.)
 —, with Mollaret, 350 *bis* (Lept.)
 Erf, L. A., with Peck & Crimmins, 395 (Sn.)
 Escalar, G., with Pecori, 757 (Mal.)
 Escomei, E., 53 (Fev.), 631 (Misc.)
 — & Chaves Velando, L. A., 808 (Misc.)
 Eskridge, L., with Hegner, 713 *bis* (Dys.)
 Esménard, J., with Joyeux & Sédan, 135 (Hel.)
 Espian, M., with Le Gac & Rarivoson, 952 (Hel.)
 Espié, A., 87 (Hel.)
 Essed, W. F. R., 966 (Y. & S.)
 —, with Hidajat, 699 (R.B.F.)
 Esser, P. H., 300, (605) (Lep.)
 Esser, W., with Gessner, 492 (Misc.)
 Eubanas, F., 602 (Lep.)
 Evans, A. M., 848 (Mal.)
 — & Walker, G. R., (346) (Y.F.)
 Evans, K. L., 625 (Misc.)
 Exemplarskaya, E. V., with Epstein & Silvers, 919 (Fev.)

F.

Fabiani, G., 304 (Lep.)
 — & Dendale, R., 24 (K.A.), 535 (Am.)

Fabre, with Mercier & Soulage, 910 (Fev.)
 Fadda, S., 257, (762) (Mal.)
 Faddeeva, T., with Iwanowsky, 876 (Pl.)
 — & Tschernobaew, W., 875 (Pl.)
 Fairley, N. H., 66 (Sp.)
 — & Mackie, F. P., 471 (Misc.)
 Farges, 953 (Hel.)
 Farinaud, E., (234) (Mal.)
 Farinaud, M. E., 768 (Mal.)
 Faugère, R., with Benhamou & Choussat, 21 (K.A.)
 Faust, E. C., 94, 119 (Hel.)
 — & Diboll, C. G., 280 (Mal.)
 — & Headlee, W. H., (551) (Hel.)
 — & Martinez, W. H., 137 (Hel.)
 —, with Riley & Cook, 280 (Mal.)
 —, with Sayad & Johnson, 596 (Hel.)
 — & Swartzwelder, J. C., 547 (Am.)
 Faworissowa, B., with Joukow-Werejnikow, 371 (Pl.)
 —, with Souknev, Joukow-Werejnikow, & Kasanzeva, 877 (Pl.)
 Federated Malay States, 220, 834 (Mal.), 458, 460 (Misc.), 880 (B.R.)
 Felix, A., 32 (Fev.)
 Feng, L. C., 125 (Hel.), 486 (Misc.)
 — & Yao, K. F., 125 (Hel.)
 Fenjuk, B. & Demjashev, M., 872 (Pl.)
 Fermoselle Bacardi, J. J., with Portuondo del Pino, 585 (Hel.)
 Fernandez, A. J., 272 (Mal.)
 Fernandez, J. M. M., 607 (Lep.)
 — & Schujman, S., 311 (Lep.)
 Fernandez Valdes, A., with Gimeno de Sande, 601 (Lep.)
 Fernando, P. B. & Sandarasagara, A. P., 687 (Mal.)
 — & Wijerama, E. M., 275 (Mal.)
 Fernando, S. E., 140 (Der.)
 Feron, (945) (Lep.)
 Ferroir, J., with Mollaret, 351 (Lept.)
 Fialho, A., 145 (Der.)
 Field, J. W. & Niven, J. C., 798 (Mal.)
 Findlay, G. M. & Davey, T. H., 615 (Y.F.)
 — & Mahaffy, A. F., 342 (Y.F.)
 —, Stefanopoulos, G. J., Davey, T. H. & Mahaffy, A. F., 339 (Y.F.)
 — & Stern, R. O., 340 (Y.F.)
 Finlayson, M. H., 402 (Sn.)
 Fischl, V., 614 (Lep.)
 Fisk, R. T., with Hoyt & Moore, 323 (Rab.)
 Flecker, H., 722 (Misc.)
 Fleischer, D., 405 (Diet.)
 Fletcher, A. H., 256 (Mal.)
 Fletcher, W., 32 (Fev.)
 Flippin, H. F., 927 (Fev.)
 da Fonseca, F., 424 (Fev.), 502 (K.A.)
 Forkner, C. E. & Zia, L. S., 16 (K.A.)
 —, with — 16 (K.A.)
 Fossen, A., 883 (B.R.)
 —, with Müller, 156 (Misc.)
 Foster, A. O., 119 *bis* (Hel.)
 Fourès, R., with Benhamou, 503 (K.A.)
 Fourie, L., 871 (Pl.)
 Fourrier, J., Genova, A. & Duverger, M., 500 (K.A.)
 Fox, H., 140, 144 (Der.)
 Foy, H. & Kondi, A., 511 (Bl.), 549 (Hel.)
 —, — & Peristeris, M., 793 (Mal.)

Franchi, F. & Sautet, J., 270 (Mal.)
 Franchini, G., 468 (Misc.)
 Franco, E. E., 502 (K.A.)
 Fraser, A. G. L., with Cunningham, 54 (R.F.)
 Fraser, N. D., 298, 943 (Lep.)
 Fraser, W. A. C., (187) (Hel.)
 Freeborn, S. B. & Berry, L. J., 637 (Misc.)
 de Freitas, O., 114 (Hel.)
 French, M. H., 187 (S.S.)
 — & Hornby, H. E., 194 (S.S.)
 Fréville, L. H., 309 (Lep.)
 — & Nguyen-van-Luong, (769) (Mal.)
 Fribourg-Blanc, with Lhermitte, 621 (Y.F.)
 Fröes, H. P., 84 (B.R.)
 Früauf, V., with Gnutenko, 917 (Fev.)
 Fryer, S. V., 322 (Rab.)
 Funayama, J., 317 (Rab.)
 Fusco, G. & Chionetti, U., 630 (Misc.)

G.

Gabaldon, A., 712, 714 (Dys.)
 Gabriel, P., with Marie, 350 (Lept.)
 Gabrieljan, M. J., 90 (Hel.)
 Gallhard, H. & Sautet, J., 242 (Mal.)
 Gambia, 337 (Y.F.)
 Ganguli, A. C., 286 (Mal.)
 Ganguli, S. K., with Chopra & Sen, 275 (Mal.)
 Garcia, E. Y., 142 (Der.), 532 (Am.)
 — & Africa, C. M., 587 (Hel.)
 —, with —, 91, 104 (Hel.)
 —, with — & Layco, 131 (Hel.)
 —, with — & de Leon, 90, 560 *bis*, (Hel.)
 Garnham, P. C. C., 262 (Mal.)
 Gaschen, H., with Genevray, Autret & Doderio, 489 (Misc.)
 —, with Morin & Nguyen-Dinh-Hao, 836 (Mal.)
 —, with Raynal, 850 (Mal.)
 Gater, B. A. R., 497 (B.R.)
 Gaud & Nain, 435 (Fev.)
 Gaud, M., 18 (K.A.) 34, (926) (Fev.)
 Gauducheau, A., 532 (Am.)
 Gavrilov, W., & Dubois, A., 610 (Lep.)
 —, with Rodham, 595 (Hel.)
 Gear, H. S., 837 (Mal.)
 Genevray, J. & Doderio, J., 321 (Rab.)
 —, Gaschen, H., Autret, M. & Doderio, J., 489 (Misc.)
 Genova, A., with Fourrier & Duverger, 500 (K.A.)
 Geracitano, A., 239 (Mal.)
 Gerlach, F. & Schweinburg, F., 320, 746 *bis* (Rab.)
 Gerlach, J. H. A., 261 (Mal.)
 — with Wolff, 140 (Der.)
 Germaun, A., with Plazy, 41 (Fev.)
 Germinal, with Mazza & Basso, 207 (S.S.)
 Germond, R. C., 603, 935 (Lep.)
 Gessner, O. & Esser, W., 492 (Misc.)
 Ghosh, B. M., with Krishnan & Bose, 521 (Bl.)
 Ghosh, B. N., 813 (B.R.)
 — & Sinton, J. A., 239 (Mal.)
 Ghosh, H., 865 (Chl.)
 Gibson, P. C., with Baker, 392 (Sn.)
 Giemsa, G., 80 (Misc.)

Giglioli, G., 801 (Misc.)
 Gilbert, A. P. W., with Sossilo, 231 (Mal.)
 Gil Collado, J., 346 (Y.F.)
 Gill, C. A., 172 (S.S.), 214, 682, 687 (Mal.)
 Gille, R., with Benhamou, 505 (K.A.), 752 (Mal.)
 Gillespie, J. O., 54 (R.F.)
 Gimeno de Sande, A. & Fernandez Valdes, A., 601 (Lep.)
 Gingrich, W., 280 (Mal.)
 —, with Dawson & Hollar, 272 (Mal.)
 Ginsburg, J. M., 248 (Mal.)
 Giordano, M., (94) (Hel.)
 Giovannola, A., 954, (955) *bis* (Hel.)
 Girard, G., 366, 370, 868 (Pl.)
 — & Robic, J., 877 (Pl.)
 Giraud, Berthier, Claudio & Praliaud, 22 (K.A.)
 — & Claudio, 23 (K.A.)
 —, — & Bernard, R., 503, 504, 509 (K.A.)
 Girolami, M., 553 (Hel.)
 Giroud, P., 43, 423, 430, 431, 926 *bis* (Fev.)
 — & Haber, P., 45 (Fev.)
 — & Plotz, H., 42, 43, 438 (Fev.)
 —, with —, 916 *bis* (Fev.)
 Githens, T. S., 379 (Sn.)
 Giunta, G., 49 (Fev.)
 Glaser, R. W. & Coria, N. A., 711 (Dys.)
 Glyn-Hughes, F., with Yorke, Murgatroyd, Lester & Ross, 659 (S.S.)
 Gnochvili, I., Keigueloukhes, I. & Mourgiri, M., 780 (Mal.)
 Gnutenko, M. & Früauf, V., 917 (Fev.)
 Godding, H. C., 751 (Rab.)
 Gögl, H., 565 (Hel.)
 Goldfeder, A. E., 775 (Mal.)
 Goldie, H., 200 (S.S.)
 Goldwater, L. J., Steinberg, I., Most, H. & Connery, J. E., 122 (Hel.)
 Golob, M., 706 (Am.)
 Golovine, S., (614) (Lep.)
 Gomes, J. M., 303 (Lep.)
 Goodman, C., 42 (Fev.)
 — & Brodie, M., 42 (Fev.)
 Googe, J. T., with Keller, Cotrell, Miller, Jr. & Harvey, 583 (Hel.)
 Goosmann, C., (784) (Mal.)
 Gordon, A., with Orenstein, 567 (B.R.)
 Gordon, J. E. & Hughes, T. P., 624 (Y.F.)
 Gordon, R. M. & Davey, T. H., 514 (Bl.)
 Gorrie, R., with Waite, 136 (Hel.)
 Gotay, J. B., Costa Mandry, O. & Payne, G. C., 969 (Y. & S.)
 Gouget, R., (263) (Mal.)
 Gouttas, A., with Bensis, 516 (Bl.)
 Govi, L., with Mazza, 208 (S.S.)
 Govindaswamy, M. V., 795 (Mal.)
 Grado, G., 102 (Hel.)
 Graef, I., with Clark, 96 (Hel.)
 Graham-Yooll, M. A., 295 (Lep.)
 Gramberg, K. P. C. A., (945) (Lep.)
 Grasset, E. & Zoutendyk, A., 382 (Sn.)
 —, — & Schaafsma, A., 383 (Sn.)
 Grayson, W. B. & Hastings, G., 326 (Rab.)
 Greco, Z., with Bogliolo, 22 (K.A.)
 Greenwald, H. M., 395 (Sn.)
 Greval, S. D. S., 750 (Rab.)
 Grevenstuck, A., (725) (Misc.)

Grey, J. C. P., 870 (Pl.)
 Grieco, V., 939 (Lep.)
 Griffiths, T. H. D. & Michel, C., 344 (Y.F.)
 Grillo, J., with Schlossberger, 188 (S.S.)
 — & Schmitz, J., 189 (S.S.)
 Grimard, L., with Nattan-Larrier, 19, 21 (K.A.)
 Gritti, P., 17 (K.A.)
 Grossman, J. & Solomon, E., 776 (Mal.)
 Gruhzt, O. M., with W. D. Lindsay, G. Hendricks & M. C. Dodd, 673 (S.S.)
 Grunske, F., 809 (B.R.)
 Grütz, O., 142 (Der.)
 Guerricchio, A., 18 (K.A.)
 Guha, P. K., 29 (K.A.)
 Guillain, G. & Lereboullet, J., 351 (Lept.)
 Guinto, R., with Doull, Rodriguez & Plantilla, 931 (Lep.)
 Gunther, C. E. M., 41 (Fev.)
 Gupta, B. M. D., 490 (Misc.)
 Gupta, C. R. D., with Napier, 75 (Misc.)
 Gupta, J. C., with Chopra & Roy, 492 (Misc.)
 —, with — & Sen, 795 (Mal.)
 Gupta, P. K. S., (270) (Mal.)
 Gupta, S. K., with Pasricha & de Monte, 865 (Chl.)
 Gurkiral Singh, with Taylor & Ahuja, 377 (Chl.)

H

Habachi, S., with Meyerhof, 449 (Oph.)
 Haber, P., with Giroud, 45 (Fev.)
 Hackett, C. J., 962 bis (Y. & S.)
 Hackett, L. W. & Lewis, D. J., 848 (Mal.)
 Hager, F. D., with Zinsser & Castaneda, 429 (Fev.)
 Hai, with Mickaniewski, (769) (Mal.)
 Hakansson, E. G., 534 (Am.)
 Halder, K. C., with Smith, 26 (K.A.)
 Halder, M. N., with Chatterjee, 408 (Diet)
 Hall, M. C., 950 (Hel.)
 Hameed, A., 631 (Misc.)
 Hamid, E. A., (278) (Mal.)
 Hamilton, A. H., 160 (B.R.)
 Hamilton, T. D., with Harvey, 479 (Misc.)
 Hansmann, G. H. & Schenken, J. R., 143 (Der.)
 Hanson, H., 280 (Mal.), 929 bis (Fev.)
 Happold, F. C. & Stephenson, D., 489 (Misc.)
 Harbhagwan, with Sinton, 282 (Mal.)
 Harrison, R. W., with Julianelle, 449 bis (Oph.)
 Harvey, D., 33 (Fev.)
 Harvey, R. H., with Keller, Googe, Cottrell, & Miller, Jr., 583 (Hel.)
 Harvey, W. F. & Hamilton, T. D., 479 (Misc.)
 Haslé, G., Toullec, F. & Vaucel, M., 61, 353 (Lept.)
 —, with Vaucel, 474 (Misc.)
 Hastings, G., with Grayson, 326 (Rab.)
 Hauer, A., 523 (Bl.)
 Hay, D. C., Spaar, A. E. & Ludovici, H. L., 791 (Mal.)
 Hazen, E. L., with Maillard, 47 (Fev.)
 Headlee, T. J., 486 (Misc.)
 Headlee, W. H., 121 (Hel.)
 —, with Faust, (551) (Hel.)

Health Brista, (761) (Mal.)
 Heathman, L. S., 589 (Hel.)
 Hegner, R. & Eskridge, L., 713 bis (Dys.)
 Heiberg, B., 862 bis (Chl.)
 Heimbürger, L. F., with Cowdry, 301 (Lep.)
 —, with — & Williams, 605 (Lep.)
 Hemenway, R. V., with Dang & Lau, (777) (Mal.)
 Henderson, W. W., 172 (S.S.)
 Hendricks, G., with Gruhzt, Lindsay & Dodd, 673 (S.S.)
 Henry, A. F. X., 329 (B. R.)
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 de Magalhães, O., with Moreira, 40, 915 (Fev.)
 Magoon, E. H., 286 (Mal.)
 Mahaffy, A. F., with Findlay, 342 (Y.F.)
 —, with —, Stefanopoulo & Davey, 339 (Y.F.)
 —, with Lloyd, 624 (Y.F.)
 Maillard, E. R. & Hazen, E. L., 47 (Fev.)
 Mainoli, M. R., with Mazza, (678) (S.S.)
 Mainzer, F., 96 (Hel.)
 Majumder, A. R., 540 (Am.)
 Malamos, B., 81 (Misc.)
 —, with Nauck, 840 (Mal.)
 Maldonado, J. G., 941 (Lep.)
 Maldonado Sampedro, M., 118 (Hel.)
 Mallick, S. M. K., 399 (Sn.)
 —, with Shortt, 387 (Sn.)
 —, with Taylor, 387 (Sn.)
 Mami, A., with Broc, 553 (Hel.)
 Mamou, H., with Kourilsky, 352 (Lept.)
 Manalang, C., (607), 607 *bis* (Lep.)
 Mandekos, A., with Carr & Barber, 759 (Mal.)
 Manouélian, Y., 320 (Rab.)
 Mansell, R. A., (854) (Mal.)
 Manson, D., 625 (Misc.), 794, 840 (Mal.)
 Manson-Bahr, P., 160 (B.R.), 709 (Dys.)
 — & Low, with Walters, 585 (Hel.)
 Manuwa, S. L. A., 475 *bis* (Misc.)
 Manwell, R. D., 237 (Mal.)
 Maplestone, P. A., 111 (Hel.)
 — & Mukerji, A. K., 117 (Hel.)
 — & Mukerji, P. K., 575 (Hel.)
 — & Riddle, J. S., 566 (Hel.)
 Marañon, J., Perez, A. & Russell, P. F., 232 (Mal.)
 Marchal, G., Soulie, P. & Roy, A., 352 (Lept.)
 Marchesi, F., 61 (Lept.)
 —, Crainz, F. & Scapaticci, R., 18, 508 (K.A.)
 — & Scapaticci, R., 22 (K.A.)
 Marchoux, E., Chorine, V. & Koechlin, D., 57 (R.F.), 307 (Lep.)
 Marcus, J. M. & Wainer, K. G., 902 (Oph.)
 Mariani, G., with Besta, 305 (Lep.)
 Marie, J. & Gabriel, P., 350 (Lept.)
 Marini, C., with Decourt, Villain & Dupoux, 797 (Mal.)
 Marino, S., (536) (Am.)
 Markianos, J., with Lépine, 612 (Lep.)
 Marmo, A., (714) (Dys.)
 Marmorston, J., with Perla, 163 (B.R.)
 Marneffe, H., (799) (Mal.)
 Marque, E. & Raynal, J., 473 (Misc.)
 Marschall, F., 520 (Bl.)
 Marseille, A., 265 (Mal.)
 Martial, J. E., 271 (Mal.)
 Martin, D. S., 473 (Misc.)

- Martin, H., 494 (Misc.)
 Martin, L. A., with Blanc, 429 (Fev.)
 Martin, P. H., 458 (Misc.)
 Martin, R., Chorine, V. & Rouessé, G., 30 (K.A.)
 —, Rouessé, G. & Bonnefoi, A., 620 (Y.F.)
 Martin, R. R., with Rosen & David, 545 (Am.)
 Martin del Campo, R., 379 (Sn.)
 Martinez, W. H., with Faust, 137 (Hel.)
 Martini, E., 253, 846 (Mal.)
 Martin Sanchez, A., 697 (R.F.)
 Martz, F., 855 (Mal.)
 Masayama, 918 (Fev.)
 Masoch, T. J., with Beretervide, 535 (Am.)
 Mason, M., 164, 882 (B.R.)
 Massal, E., 600 (Lep.)
 Massias, C., 354 *bis* (Lept.), (433), 913 (Fev.), (547) (Am.)
 —, Bourgin, P. & Nguyen-van-Tan, 271 (Mal.)
 Massoud, F., 903 (Oph.)
 Masunaga, E., with Wayson, 307 (Lep.)
 Matewossian, S. M., 530 (Am.)
 Mathew, R. Y., 915 (Fev.)
 — with Langan, 41 (Fev.)
 Mathis, C., 844 (Mal.)
 —, Durieux, C. & Advier, M., 340 (Y.F.)
 Mathis, M., 240 (Mal.)
 —, with Nicolau & Baffet, 622 (Y.F.)
 —, with Rimbaut, 248 (Mal.)
 Matsumoto, I., with Nakamura & Kobashi, 306 (Lep.)
 Matsunobu, M., 801 (Misc.)
 Matsuura, T., 103 (Hel.)
 Mattlet, G., 316 (Rab.), 767 (Mal.)
 Maurano, F., 313 (Lep.)
 Maurice, H., with Sokhey, 367, 876 (Pl.)
 Mauritius, 462 *bis*, 717 (Misc.), 554 (Hel.), 763 (Mal.)
 Maxcy, K. F., 928 (Fev.)
 Maxwell, J. L., 933 (Lep.)
 May, J. M., (576) (Hel.)
 May, M., with Huard, (547) (Am.)
 May, R., 855 (Mal.)
 May, R. M., 855 (Mal.)
 Mayer, M., with Nocht, 883 (B.R.)
 Mayne, B., 280 (Mal.)
 Mayne, F. S., with Humphreys, 509 (K.A.)
 Mayne, L. C., with Austin, 527, 528 (Am.)
 Mazza, S., 676 (S.S.)
 —, Benitez, C. & Janzi, E. Z., (676) (S.S.)
 — & Corsi, E. M., (678) (S.S.)
 — & Driollet, E., 211 (S.S.)
 —, Germinal & Basso, R., 207 (S.S.)
 — & Govi, L., 208 (S.S.)
 — & Mainoli, M. R., (678) (S.S.)
 — & Nasti de Fischer, C., 209 (S.S.)
 — & Palamedi, B., (678) (S.S.)
 — & Valle, F., (678) (S.S.)
 Mededeelingen van den Dienst der Volksgezondheid in Nederlandsch-Indië, 363 (Pl.), 934 (Lep.)
 Medulla, C., 96 (Hel.), 348, 349 (R.F.)
 Meersseman, F. & Lafuma, J., (784) *bis* (Mal.)
 Megaw, J., 32 (Fev.), 858 (Mal.)
 Mehta, D. R., with Covell, 909 (Fev.)
 Meighan, S. S. & Urquhart, M., 450 (Oph.)
 de Meillon, B., 245, 845 (Mal.)
 — & Osburn, H. S., 487 (Misc.)
 Meleney, H. E., 280 (Mal.)
 — with Alexander, 528 (Am.)
 Mellanby, K., with Duke, 852 (S.S.)
 de Mello, A. L. N., 746 (Rab.)
 de Mello, F. & Loyola Pereira, O., 308 (Lep.)
 de Mello, I. F. & Brás de Sá, L. J., 259 (Mal.)
 Meneu, A., with Darder, 431 (Fev.)
 Menon, T. B., 127 (Hel.)
 — & Annamalai, D. R., 153 (Misc.)
 —, — & Krishnaswami, T. K., 505 (K.A.)
 — & Krishnaswami, T. K., 81 (Misc.)
 Mercier, H., Fabre & Soulage, 910 (Fev.)
 —, with Sicé & Robin, 656 (S.S.)
 Metivier, H. V. M., 743 (Rab.)
 Mettam, R. W. M., 175 (S.S.)
 Meyer, J., with Sartory, A., Sartory, R. & Weiss, 144 (Der.)
 Meyer, K. F., 433 (Fev.)
 — & Eddie, B., 871 (Pl.)
 —, with Wheeler & Herms, 55 (R.F.)
 Meyerhof & Habachi, S., 449 (Oph.)
 Meyer May, J., 576 (Hel.)
 — & Huard, P., 536 (Am.)
 —, with —, 727 (B.R.)
 — & Vaucel, M., 697 (R.F.)
 Michel, C., with Griffiths, 344 (Y.F.)
 Mickaniewski & Hai, (769) (Mal.)
 Miguel, A. S., with Molina, (19) (K.A.)
 Miguelote-Vianna, M., with Vellard, 390 (Sn.)
 Miller, D. G., Jr., with Keller, Gooze, Cottrell & Harvey, 583 (Hel.)
 Miller, D. K., with Mackie & Rhoads, 64 (Sp.)
 Millscher, (547) (Am.)
 Milne, J. C., (229) (Mal.)
 Milne, P. S., with Williams, 637 (Misc.)
 Mlochevitch, S., with Bordjowski, 139 (Der.)
 Mindline, J. & Rosenheim, M. L., 69 (Sp.)
 Minning, W., 210 (S.S.)
 Missiroli, A., 289, 852 (Mal.)
 Mitra, B. N., (376) (Chl.)
 —, with Linton & Mullick, 375 (Chl.)
 —, with — & Seal, (376) (Chl.)
 Miyake, S., with Takino, 608 (Lep.)
 Mochkovski, C., 269, 278, (841) (Mal.)
 Mochtar, A. & Sardjito, M., 611 (Lep.)
 Moiser, B., 297 (Lep.)
 Molina, C. & Miguel, A. S., (19) (K.A.)
 Mollaret, P., 569 (B.R.), 624 (Y.F.)
 —, with Darré, 619 (Y.F.)
 — & Erber, B., 350 *bis* (Lept.)
 — & Ferroir, J., 351 (Lept.)
 — with Findlay, G. M., 619 (Y.F.)
 Mondon, H., with Le Chuiton, Berge, Penanéach, J. & Dubreuil, 438 (Fev.)
 Monier, H. & Treillard, M., 291 (Mal.)
 Montagne, M. & Rivoalen, A., 369 (Pl.)
 Montañes, P. & Carderera, M., 258 (Mal.)
 de Monte, A. J. H., with Pasricha & Gupta, 865 (Chl.)
 —, with — & O'Flynn, 866 (Chl.)
 Monteiro, J. L., 428 (Fev.)
 Montel, M. L. R., (312) (Lep.)
 —, Le Van-Phung, Nguyen-van-Khai, Tran-van-Hanh, Do-van-Hoanh, Truong-van-Que & Nguyen-ngoc-Nhuan, 309 (Lep.)
 — & Truong-van-Que, 132 (Hel.), 309 *bis* (Lep.)

Montel, R., 309 *bis*, 944 (Lep.), 914 (Fev.)
 —, Bablet, J., Nguyen Ngoc Nhuan & Do van Hoanh, 944 (Lep.)
 — & Le-van-Phung, 612 (Lep.)
 — & Tran-van-Hanh, 310 (Lep.)
 — & Truong-van-Que, 700 (R.B.F.)
 Montestruc, E., 836 (Mal.)
 — & Bertrand, C., 127, 557 (Hel.)
 Mookerjee, S. L., with Wilson, 493 (Misc.)
 de Moor, C. E., with Lampe, 307, 945 (Lep.)
 Moore, F. J., with Hoyt & Fisk, 323 (Rab.)
 Mora, A. D. & Soares, J. C., 933 (Lep.)
 Morales Otero, P., (875) (Pl.)
 Morales Villazón, N., with Uriarte, 362, 370 *bis* (Pl.)
 —, with — & Anchezar, 362, 370 (Pl.)
 de Moraes, C. V., 272 (Mal.)
 Morcos, Z., 531 (Am.)
 Moreau, P., with Ragiot, 839 (Mal.)
 —, with Sicé, 179 (S.S.)
 Moreira, J. A. & de Magalhães, O., 40, 915 (Fev.)
 Morimoto, T., 60 (Lept.)
 Morin, H. G. S., 761 (Mal.)
 —, Gaschen, H. & Nguyen-Dinh-Hao, 836 (Mal.)
 Morrison, W. K., 566 (Hel.)
 Mosna, E. & Salustri, E., 266 (Mal.)
 Most, H., with Goldwater, Steinberg & Conerny, 122 (Hel.)
 Mostert, H. v. R., 524 (Bl.)
 Mosto, D., 539 (Am.)
 Mo Ten Sei, 506 (K.A.)
 Motta, O. C., 705 (Am.)
 Moulinard, M., 958 (Hel.)
 Mourgiri, M., with Gnochvili & Keigueloukhes, 780 (Mal.)
 Moursund, W. H., with Kemp & Wright, 347 (R.F.)
 Moustardier, G., 656 (S.S.)
 Muench, H., with Boyd & Stratman-Thomas, 779 (Mal.)
 Mühlens, P., (596) (Hel.)
 Muir, F., 603, 608 (Lep.)
 — & Chatterji, S. N., 299, 938 (Lep.)
 Mukherjee, S. N., with Chopra, 841 (Mal.)
 —, with Krishnan & Chopra, 79 (Misc.)
 Mukerji, A. K., with Maplestone, 117 (Hel.)
 Mukerji, P. K., with Maplestone, 575 (Hel.)
 Mulder, J. G. A., 74 (Misc.)
 Müller, H. & Fossen, A., 156 (Misc.)
 Muller, K. L., 356 (R.B.F.)
 Muller, P., 66 (Sp.)
 Mullick, D. N., with Linton & Mitra, 375 (Chl.)
 Mulrennan, J. A., with Boyd & Kitchen, 843 (Mal.)
 Muniz, J. & Regendanz, P., 428 (Fev.)
 —, with —, 427 (Fev.)
 Murashima, T., 707 (Dys.)
 Murgatroyd, F., with Yorke, Glyn-Hughes, Lester & Ross, 659 (S.S.)
 de Muro, P., 273 (Mal.)
 Murray, A. J., (53) (Fev.)
 Murray, I., 632 (Misc.)
 Murthi, K. N., with Pillai, 65 (Sp.)
 Musgrave, J. A., 548 (Hel.)
 Mustapha, A., 861 (Chl.)

N

Naab, J. P., 30 (K.A.)
 Nagahama, M., with Nishiyama, 965 (Y. & S.)
 Nain, with Gaud, 435 (Fev.)
 Nair, P. K., 107 (Hal.)
 Najera Angulo, L., 19, 499 (K.A.)
 Nakamura, K., Kobashi, S. & Matsumoto, I., 306 (Lep.)
 Nanavati, B. P., with Duggan, 903 (Oph.)
 Napier, L. E., 16 (K.A.)
 — & Gupta, C. R. D., 75, 803 (Misc.)
 Natri de Fischer, C., with Mazza, 209 (S.S.)
 National Economic Council, 454 (Misc.)
 Nattan-Larrier, L. & Dufour, J., 506, (K.A.)
 — & Grimard, L., 19, 21 (K.A.)
 — & Nougues, S., 28 (K.A.)
 Nauck, E. G. & Malamos, B., 840 (Mal.)
 Naumann, H. F., 523 (Bl.)
 Nauss, R. W. & Salinger, M. H., 526 (Am.)
 Navoka, J. R., 708 (Dys.)
 de Negri, U., with Sepulcri, 844 (Mal.)
 Negro Vazquez, E., 499 (K.A.)
 Nelson, E. C., 711 (Dys.)
 Neogi, S. K., 851 (Mal.)
 Nesslerin, H., with Sicault, (777) (Mal.)
 Neumann, H., with Schilling, Schreck & Kuncert, 195, 664 (S.S.)
 Neveu-Lemaire, M., 643 (B.R.)
 Newman, M. S., with Anderson, Crowder & Stodola, 940 (Lep.)
 Ngo-quang-Ly, with Dorolle, 309 (Lep.)
 —, with —, Huynh-van-Huy & Tran-van-Tam, 612 (Lep.)
 Nguyen-Dinh-Hao, with Morin & Gaschen, 836 (Mal.)
 Nguyen Ngoc Nhuan, with Montel, Bablet & Do van Hoanh, 944 (Lep.)
 —, with —, Le-van-Phung, Nguyen-van-Khai, Tran-van-Hanh, Do-van-Hoanh & Truong-van-Que, 309 (Lep.)
 Nguyen-van-Huong, with Ragiot, Delbove & Ho-thieu-Hgan, 354 (Lept.), 433 (Fev.)
 Nguyen-van-Khai, with Montel, Le-van-Phung, Tran-van-Hanh, Do-van-Hoanh, Fruong-van-Que & Nguyen-ngoc-Nhuan, 309 (Lep.)
 Nguyen-van-Luong, with Fréville, (769) (Mal.)
 Nguyen-van-Tan, with Bourgin (228) (Mal.)
 —, with Massias & Bourgin, 271 (Mal.)
 Nguyen-van-Tung, (312) (Lep.)
 Nicholls, L., 65 (Sp.)
 Nicol, W. D., 279 (Mal.)
 —, with James & Shute, P. G., 684 (Mal.)
 Nicolau, S. & Baffet, O., 322 (Rab.)
 —, Mathis, M. & Baffet, O., 622 (Y.F.)
 Nicoletti, F., 965 (Y. & S.)
 Nicolle, C., 138 (Fev.)
 — & Laigret, J., 34, 437 (Fev.), 619 (Y.F.)
 — & Sparrow, H., 44 *bis*, 48 (Fev.)
 Nieuwenhuis, A. W., 754 (Mal.)
 Njeva, D. E., 95 (Hel.)
 Nigeria, 172 (S.S.), 337 (Y.F.)
 Nigg, C., 424, 916 (Fev.)
 Niimi, S., 210 (S.S.)
 Nikolić, M., 325, 326 (Rab.)
 Niño, F. L., 471 (Misc.), 591 (Hel.)
 Nishiyama, K. & Nagahama, M., 965 (Y. & S.)

van Nitsen, R., (229) (Mal.)
 Niven, J. C., with Field, 798 (Mal.)
 Nobrega, P., with Reis, J. & Reis, A. S., 643 (B.R.)
 Nocht, B., (613) (Lep.)
 — & Mayer, M., 883 (B.R.)
 — & Velasco, F., 315 (Lep.)
 Noël, G., with Dubois, 439 (Fev.)
 Nolasco, J. O., 296, (609) (Lep.)
 Nolf, L. O., & Edney, J. M., 122 (Hel.)
 Noosten, H. H. & Visser, J., 805 (Misc.)
 Nougues, S., with Nattan-Larrier, 28 (K.A.)
 Noury, M., 430 (Fev.)
 —, with Blanc, 699 (R.B.F.), 921, 924 (Fev.)
 —, with — & Baltazard, 437, 924 (Fev.)
 Novák, E., with von Jancsó, 56 (R.F.)
 Nukada, M., with Schöbl, 372 (Chl.)
 de Nunno, R., 236 (Mal.)

O

Ochoterena, I., 103 (Hel.)
 O'Connor, F. W., 526 (Am.)
 — & Hulse, C. R., 592 (Hel.)
 O'Connor, M. P., 420 (Fev.)
 d'Oelsnitz, 25 (K.A.)
 Oesterlin, M., 663 (S.S.)
 O'Flynn, E. G., with Pasricha & de Monte, 866 (Chl.)
 Ogata, N., 441 (Fev.)
 Ogilvie, W. H., 572 (B.R.)
 Oguro, T., 537 (Am.)
 Ohashi, K., 87 (Hel.)
 Olavarria, J., with Hill, 270 (Mal.)
 Olesen, R., 324 (Rab.)
 Olmer, D., Olmer, J. & Audier, M., 910 (Fev.)
 Olmer, J., with Olmer, D. & Audier, 910 (Fev.)
 O'Meara, F. J., 447 (Fev.)
 Orenstein, A. J. & Gordon, A., 567 (B.R.)
 Orr, H. C., 905 (Oph.)
 Osborn, H. A., 136 (Hel.)
 Osburn, H. S., with de Meillon, 487 (Misc.)
 Osgood, E. E., 483 (Misc.), 856 (Mal.)
 Otten, L., 365 (Pl.)
 Otto, G. F., 562, 563, 581, 588 (Hel.)
 Otto, I. H., 523 (Bl.)
 Ovchinnikov, M. M., with Rybinsky, 838 (Mal.)
 Ozeki, Y., 59 (R.B.F.)

P

Pai, H. C., 803 (Misc.)
 Pai, N. G., with Krishnan, 517 (Bl.)
 Palacios, L. D., with Earle & Arbona, 837 (Mal.)
 Palamedì, B., with Mazza, (678) (S.S.)
 Palestine, 466 (Misc.), 749 (Rab.)
 Palthe, P. M. van W., 74 bis (Misc.)
 Panayotatou, A., 500 (K.A.), 537 (Am.)
 Pandit, C. G., with Wright & Seetharama Iyer, 127 (Hel.)
 Pandit, S. R., 777 (Mal.)

Panja, D., 407 (Diet.)
 —, with Chopra & Chaudhuri, 145 (Der.)
 Panja, G., (938) (Lep.)
 Pannier, R., 672 (S.S.)
 Papantonakis, E., 17, 500 (K.A.)
 Paparcone, 449 (Oph.)
 Pardal, E., 361 (Pl.)
 Pardo-Castello, V., (605) (Lep.)
 Pareli, A., (799) (Mal.)
 Paris : Office International d'Hygiène Publique, (616) (Y.F.)
 Parise, N., (721) (Misc.)
 Parish, H. E. & Laake, E. W., 488 (Misc.)
 Parker, R. R., 47, 440 (Fev.)
 Parreiras, D., (870) (Pl.)
 Parrot, L., with Sergeant Edm., Sergeant, Et. & Catanei, 757 (Mal.)
 Parvis, F., with Scartozzi, 93 (Hel.)
 Pasco, A. M., with Tubangui, Basaca & Del Rosario, 582 (Hel.)
 Pascual, A., with Cano, (348) (R.F.)
 Pasricha, C. L., Bannerjee, K. & Lal, S., 924 (Fev.)
 —, de Monte, A. J. H. & O'Flynn, E. G., 866 (Chl.)
 —, — & Gupta, S. K., 865 (Chl.)
 Passalacqua, R., with Uriarte & Argerich, 361 (Pl.)
 Paterson, A. R., 251 (B.R.)
 Paty, R. M., Jr., with Yui, (777) (Mal.)
 Paul, M., 613 (Lep.)
 Pavlinova, Y., with Taliaferro, 671 (S.S.)
 Pavlovsky, E. N., 330 bis, 331 (B.R.)
 Pawan, J. L., 227 (Mal.) 742 (Rab.)
 Payne, G. C., with Castle, Rhoads & Lawson, 66 (Sp.)
 —, with Gotay & Costa Mandry, 969 (Y. & S.)
 Peck, S. M., Crimmins, M. L. & Erf, L. A., 395 (Sn.)
 — & Rosenthal, N., 394 (Sn.)
 Pecori, G. & Escalar, G., 757 (Mal.)
 Pedlow, J. T., with Reiner & Smythe, 670 (S.S.)
 Peirce, E. R., 879 (Pl.)
 Peirier & Raymond, 142 (Der.)
 Peña Chavarria, A. & Rotter, W., 584 (Hel.)
 Penfold, H. B., with Penfold, W. J. & Phillips, 564 (Hel.)
 Penfold, W. J., Penfold, H. B. & Phillips, M., 564 (Hel.)
 Pennanéac'h, J., with Le Chuiton & Berge, 439, 927 (Fev.)
 —, with —, Mondon, Berge & Dubreuil, 438 (Fev.)
 Penso, G., 122 (Hel.), 533 (Am.)
 Pepeu, F., 379, 397, 398 (Sn.)
 Pereira, L., 934 (Lep.)
 Pereira da Silva, E., 748 (Rab.)
 Pereira, P. C. R., 942 (Lep.)
 Perez, A., with Marañon & Russell, 232 (Mal.)
 Pergher, G., 923 (Fev.)
 Pergher, J. & Casier, J., 423 (Fev.)
 Peristeris, M., with Foy & Kondi, 793 (Mal.)
 Perla, D. & Marmorston, J., 163 (B.R.)
 Perry, H. M. & Poole, L. T., 489 (Misc.)
 Peruzzi, M., 183 (S.S.)
 Peschle, B., 444 (Fev.)
 Peter, F. M., 233 (Mal.)

- Peters, B G , 947 (Hel)
 Petersen, M C , 856 (Mal)
 Petrov, V B , 25 (K A)
 —, with Chodukin & Kevorkov, 500 (K A)
 Petruschewsky, G K & Boldyr, E D , 98 (Hel)
 Pfomm, E , 159 (Misc)
 Phillips, M , with Penfold, W J & Penfold, H B , 564 (Hel)
 Piér, J , 26, 502 (K A)
 — & Sardon, 952 (Hel)
 Pieter, 606 (Lep)
 Pietermaritzburg, 422 (Fev)
 Pile, G R , with van Rooyen, 279 (Mal)
 Pillai, M J S & Murthi, K N , 65 (Sp)
 Pinkerton, H , 907 (Fev)
 Pinto, G de S , (269) (Mal)
 Piot, M , 633 (Misc)
 Pirumow, 854 (Mal)
 Pitruzzella, R , 504 (K A)
 Pittaluga, 499 (K A)
 Piza, J de T , 40 (Fev)
 Plantilla, F C , 604 (Lep)
 — with Doull, Rodriguez & Guinto, 931 (Lep)
 — & Mabalay, E , 402 (Sn) , 966 (Y & S)
 —, with Rodriguez 604 (Lep)
 Plazy, L & Germain, A 41 (Fev)
 Plotnikov, N & Zertchaninov, L , 559 (Hel)
 Plotz, H & Giroud, P 916 bis (Fev)
 —, with —, 42, 43, 438 (Fev)
 Plum, D , 115 (Hel)
 Poggi, I , (113) (Hel) , 257, (290) (Mal) , (636) (Misc)
 Poundexter, H A , 77 (Misc) , 184 (S S)
 Pokrowskaja M , 876 (Pl)
 Pokrowski S W 283 (Mal)
 Poldori, T , 721 (Misc)
 Pollitzer, R with Wu I ien-Teh, Chun & Wu, 726 (B R)
 Ponder E & Abels J C 521 (Bl)
 Pons, J A , with Rodriguez Molina, 555 (Hel)
 Poole L T with Perry, 489 (Misc)
 —, with Shortt & Stephens, 53, (53) (Fev)
 Pooman, A (606) (Lep)
 Popov, P , 25 (K A)
 Popovici, A , with Dimitriu, 265 (Mal)
 Portuguese Guinea 176 (S S)
 Portuondo del Pino, A & Fermoselle Bacardi, J J , 585 (Hel)
 Potchechuyev, K , 20 (K A)
 Pottier, R & Van den Branden, F , 201, 662, (S S)
 —, with — & Appelmanns, 202, 662 (S S)
 Poulton, W F , 174, 175 (S S)
 Pound, R E , with Mackie, 63 (Sp)
 Poursines, Y , Soulie, P & Scandarami, T , 508 (K A)
 van Praag, A , 68 (Sp)
 Prahaud, with Graud, Berthier & Claudio, 22 (K A)
 Prescriber, (291) (Mal)
 Preto, G , 698 (R F)
 Prica, M , 44 (Fev)
 Priest, R , 39 (Fev)
 Prieur, M , with Launoy & Ancelet, 203 (S S)
 Prima, A , with Redaelli, 29 (K A)
 Proca, G & Jonnesco, D , 744 (Rab)
 Proceedings of the Royal Society of Medicine, 679 (Mal)
 Proctor, F I , with Thygeson & Richards, 450 (Oph)
 Prudhomme, R O , 230, 780 (Mal) , 610, 945 (Lep)
 —, with Chorine, 505 (K A)
 Pulvertaft, 902 (Oph)
 Purcaro, G & Elisei, C , 529 (Am)
 Puri, I M , 287, 853 (Mal)
- Q**
- Quarterly Bulletin of the Health Organisation, League of Nations, 499 (K A) , 668 (S S) , 749 (Rab) , 868 (Pl) , 906 (Fev)
 Quintana Otero, F , 758 (Mal)
- R**
- Radhakrishna Rao, M V , 484 (Misc)
 Radsma, W , 71 (Misc)
 Radzivilovsky, G L , with Shevtchenko, 507 (K A)
 Raevsky, W , with Kalabuchov, 872 (Pl)
 Rafael Risquez, J 573 (Hel)
 Raffaele, G & Lega G , 844 (Mal)
 Raffel, S 205 (S S)
 Ragiot, C , 798 (Mal)
 — & Delbove, P 38, 39 (Fev)
 —, —, Nguyen-van-Huong & Ho-thien-Ngan, 354 (Lept) , 433 (Fev)
 — & Moreau, P , 839 (Mal)
 Raja K C K E , 803 (Misc)
 Ram, R , 260 (Mal)
 Ramaqa, V T , 493 (Misc)
 Ramos e Silva, J 966 (Y & S)
 Ramsay, G C , Chandra, S N & Lamprell, B A , 843 (Mal)
 Ramsay, G W St C , 551 (Hel)
 Rankov, M , 777 (Mal)
 Rao, G R , with Roy, 611 (Lep)
 Rarivison, A , with Espian & Le Gac, 952 (Hel)
 Rasanayagam, S , with Veerasingham, 299 (Lep)
 Rasmussen, O D , 904 (Oph)
 Rattner H , 411 (Diet)
 Ray, J C , 30 (K A)
 de Raymond, 309 (Lep)
 Raymond, with Perier, 142 (Der)
 Raymond, W D , 81, 634, 723 (Misc)
 Raynal, J , 784, (784) bis (Mal) , 867 (Chl)
 — & Gaschen, H , 850 (Mal)
 —, with Marque, 473 (Misc)
 Recueil de Médecine Vétérinaire Exotique, 750 (Rab)
 Redaelli, P , with Ciferri, 491 (Misc)
 — & Prima, A , 29 (K A)
 Reed, A C & Anderson, H H , 540 (Am)
 — & Johnstone, H G , 63 (Sp)
 Reenstierna, J , 614 (Lep)
 Regendanz, P & Muniz, J , 427 (Fev)
 —, with —, 428 (Fev)
 Rehde, R , 784 (Mal)
 Reichenow, E , (531) (Am)

- Reiner, L., Smythe, C. V. & Pedlow, J. T., 670 (S.S.)
 Reis, A. S., with Reis, J. & Nobrega, 643 (B.R.)
 Reis, J. & Nobrega, P. with A. S. Reis, 643 (B.R.)
 Reitano, U., 429 (Fev.)
 Remlinger, P., 325 (Rab.)
 — & Bailly, J., 316, 320, 325, 744, 745 (Rab.)
 Renucci, N., with Huard & Huynh-Tan-Doi, 536 (Am.)
 Repetto, L., (269) (Mal.)
 Rerrie, J. I., with Saunders & Kumm, 960 (Y. & S.)
 Ressler, K., 696 (R.F.)
 Reuter, J., 415 (B.R.)
 Reyntjens, 513 (Bl.)
 Rhoads, C. P., with Castle, Lawson & Payne, 66 (Sp.)
 —, with Mackie & Miller, 64 (Sp.)
 Ribeiro, L., 300 (Lep.), 868 (Pl.)
 Ricci, N. I., with Lloyd & Theiler, 623 (Y.F.)
 Rice, E. M. (373) (Chl.), 773, 774 (Mal.)
 Rice, J. B., with Barber, 258, 762 (Mal.)
 Richards, P., with Thygeson & Proctor, 450 (Oph.)
 Richardson, R. C., 602 (Lep.)
 Richet, P., 959 (Hel.)
 Richter, R., with Rothermundt, 194 (S.S.)
 Riddle, J. S., with Mapstone, 566 (Hel.)
 Riesel, M., with De la Barrera, 362 (Pl.)
 Rigdon, R. H., with Calder, 712 (Dys.)
 Riley, G. E., Faust, E. C. & Cook, S. S., 280 (Mal.)
 Rimbaut, G. & Mathis, M., 248 (Mal.)
 Riolo, P., 276 (Mal.)
 Ríos Ner, F., with Bustamante & Varela, 36 (Fev.)
 Riou, M., with Toullec, 913, 914 (Fev.)
 Ristorcelli, (769) (Mal.)
 de Rivas, D., with de Rivas, C. T., 82 (B.R.)
 de Rivas, G. T., with Johnson, 675 (S.S.)
 Rivierez, M., with Boyó, 145 (Der.)
 Rivista di Malarologia, 755 (Mal.)
 Rivoalen, A., with Montagne, 369 (Pl.)
 Roberts, J. I., 359, (360) (Pl.)
 — & Tonking, H. D., 632 (Misc.)
 Robertson, A., 186 (S.S.)
 Robertson, R. C., 949, 959 (Hel.)
 Robic, J., with Girard, 777 (Pl.)
 Robin, C., with Sicé, (879) (Mal.)
 —, with — & Mercier, 656 (S.S.)
 Robin, L. & Truong-van-Huan, 271 (Mal.)
 Rockefeller Foundation, 165, 166, 882 (B.R.)
 Rodhain, J. & Gavrilov, W., 595 (Hel.)
 — & Henry, E., 671 (S.S.)
 — & Valcke, G., 134 (Hel.)
 Rodriguez, J., 298, 299 (Lep.)
 —, Mabalay & Tolentino, (601) (Lep.)
 — & Plantilla, F. C., 604 (Lep.)
 Rodriguez, J. N., with Doull, Guinto & Plantilla, 931 (Lep.)
 Rodriguez Molina, R., 116, 954, (954) (Hel.)
 — & Pons, J. A., 555 (Hel.)
 Rodríguez y Remos, C., with Carbonell y Salazar, 576 (Hel.)
 Roman, E., 636 (Misc.)
 Rominger, E. & Bomskov, C., 70 (Sp.)
 van Rooyen, C. E. & Pile, G. R., 279 (Mal.)
 Rosa, A., 253 (Mal.)
 — & Valli, E. S., 786 (Mal.)
 Rosen, E. A., Martin, R. R. & David, N. A., 545 (Am.)
 Rosenfeld, S. & Lenke, S. E., 393 (Sn.)
 Rosenheim, M. L., with Mindline, 69 (Sp.)
 Rosenthal, J. M., 138 (Der.)
 Rosenthal, N., with Peck, 394 (Sn.)
 Ross, A. O. F., with Yorke, Murgatroyd, Glyn-Hughes & Lester, 659 (S.S.)
 Rossi, J. E., 578 (Hel.)
 Rossi, P., 20 (K.A.)
 Rothermundt, M. & Richter, R., 194 (S.S.)
 Rothfield, J., with Trawinski, 104 (Hel.)
 Rotter, W., 109 (Hel.)
 —, with Peña Chavarria, 584 (Hel.)
 Roubaud, E., 180 (S.S.)
 — & Colas-Belcour, J., 653 (S.S.)
 —, — & Treillard, M., 288 (Mal.)
 — & Treillard, M., 207, 674 (S.S.)
 Rouché, 771 (Mal.)
 Rouessé, G., with Martin & Bonnefoi, 620 (Y.F.)
 —, with — & Chorine, 30 (K.A.)
 Roussac, C., with Claudio & Lumbroso, 506 (K.A.)
 Roussel, H., with Sparrow, 434 (Fev.)
 Row, R., 28 (K.A.)
 Roy, A., with Marchal & Soulie, 352 (Lept.)
 Roy, A. C., with Chopra, 273 (Mal.), 382 (Sn.)
 —, with — & Gupta, 492 (Misc.)
 Roy, A. T. & Rao, G. R., 611 (Lep.)
 Roy, D. N., with Struckland, 851 (Mal.)
 Roy, P. K., 255 (Mal.)
 Rozeboom, L. E., 284 (Mal.)
 Russell, A. J. H., 372 (Chl.)
 Russell, P. F., 767 (Mal.)
 — & Baisas, F. E., 487 (Misc.)
 — with Marañón & Perez, 232 (Mal.)
 Rybinsky, S. B. & Ovchinnikov, M. M., 838 (Mal.)
 Ryo, S., 949 (Hel.)
 Ryrie, G. A., 944 (Lep.)
- S.**
- Sabadini, L., 814 (B.R.)
 Sabin, F. R., Smithburn, K. C. & Thomas, R. M., 302 (Lep.)
 Sabrazès, J., Lannelongue, G., Dutrénit, J. & Bonnel, 353 (Lept.)
 van Saceghem, R., 188, 666 (S.S.)
 Sadojan, W. S. & Istamanjan, L. S., 259 (Mal.)
 Sagorskaja, M., with Tikhomirova & Iljin, (368) (Pl.)
 Sainte-Marie, F., (233) (Mal.)
 Sainte Marie, P. E. F., 295 (Lep.)
 Saito, K., with Kuo, Takahara & Adachi, 627 (Misc.)
 Saito, Y., 501 (K.A.)
 Salah, M., 148, 153 (Misc.)
 —, with Khalil, 112 (Hel.)
 Salata, C. C., with Liverato, (784) (Mal.)
 Saleun, G., & Ceccaldi, J., 342 (Y.F.)
 Salinger, M. H., with Nauss, 526 (Am.)

- Salustri, E., with Mosna, 266 (Mal.)
 Samsonow, T., 875 (Pl.)
 Samuel, J., 81 (Misc.)
 Samy, M., 555 (Hel.)
 Sanchez Santiago, B., with Carbonell y Salazar, 705 (Am.)
 de Sanctis Monaldi, T., 283 (Mal.)
 Sandarasagara, A. P., with Fernando, 687 (Mal.)
 Sanders, J. P., 788 (Mal.)
 Sanner, L. & Loumagne, 52 (Fev.)
 Santamarina, V., with Inclan, 481 (Misc.)
 Sanz Astolfi, J., 593 (Hel.)
 Sardjito, M., with Mochtar, 611 (Lep.)
 Sardon, with Piéri, 952 (Hel.)
 Sarkissian, A. B., (505) (K.A.)
 Sarkissiane, A. B., (779) (Mal.)
 Sartory, A., Sartory, R., Meyer, J. & Weiss, R., 144 (Der.)
 Sartory, R., with Sartory, A., Meyer & Weiss, 144 (Der.)
 Sasaki, T., 110 (Hel.)
 Sassuchin, D., Ioff, I. & Tiflow, W. (879) (Pl.)
 Sato, K., with Yaoi & Kanazawa, 743 (Rab.)
 Satta, E., 553, 953 (Hel.)
 Sauerstein, H., with Hoff, 562 (Hel.)
 Saunders, G. M., Kumm, H. W. & Rerrie, J. I., 960 (Y. & S.)
 Sautet, J., 283, 772 (Mal.)
 —, with Franchi, 270 (Mal.)
 —, with Galliard, 242 (Mal.)
 Sautter, V., with Lépine, 322 (Rab.), 430 (Fev.)
 Savagnone, L., 18 (K.A.)
 Savino, E., 362, 363 (Pl.)
 Savoor, S. R., Castaneda, M. R. & Zinsser, H., 436 (Fev.)
 —, with Lewthwaite, 424, 911, 921, 922 (Fev.)
 Sawyer, W. A., 615, 622 (Y.F.)
 — & Whitman, L., 335 (Y.F.)
 Sayad, W. Y., Johnson, V. M. & Faust, F. C., 596 (Hel.)
 Sayid, I. A., 544 (Am.)
 Sazerac, R. & Larthe, N., 664 (S.S.)
 Scales, C., 436 (Fev.)
 Scandarani, T., with Poursines & Soulie, 508 (K.A.)
 Scapaticci, R., with Marchesi, 22 (K.A.)
 —, with — & Crainz, 18, 508 (K.A.)
 Scartozzi, C. & Parvis, F., 93 (Hel.)
 Schaafsma, A., with Grasset & Zoutendyk, 383 (Sn.)
 Scharrer, B., 58 (R.F.)
 Scharff, J. W., 770, 771 (Mal.)
 Schartum-Hansen, H., 800 (Misc.)
 Scheepe, F. L., 125 (Hel.)
 Schenken, J. R., with Hiansmann, 143 (Der.)
 Schichobalowa, N., with Schulz, 597 (Hel.)
 Schieber, H., with Adler & Theodor, 693 (R.F.)
 Schilling, C., (763) (Mal.)
 —, with H. Schreck, H. Neumann & H. Kunert, 195, 664 (S.S.)
 Schinzel, A., 58 (R.B.F.)
 Schlossberger, H. & Grillo, J., 188 (S.S.)
 Schmid, F., 105 (Hel.)
 Schmidt, K., 100 (Hel.)
 Schmitz, J., with Grillo, 189 (S.S.)
 Schöbl, O. & Nukada, M., 372 (Chl.)
 Schoen, R., with Levaditi, 318, 319 *bis*, 750 (Rab.)
 Schoening, H. W., 750 (Rab.)
 Scholtens, R. T., (376), 864 (Chl.)
 Schreck, H., with Schilling, Neumann & Kunert, 195, 664 (S.S.)
 Schujman, S., 298, 605 (Lep.)
 —, with Fernandez, 311 (Lep.)
 Schulemann, W., (275) (Mal.)
 Schulz, H. H., 51 (Fev.)
 Schulz, R. E. & Schichobalowa, N., 597 (Hel.)
 Schweinburg, F., with Gerlach, 320, 746 *bis* (Rab.)
 Schwenck, J., 86 (Hel.)
 Schwetz, J., 277, 766 (Mal.)
 Schwieter, 761 (Mal.)
 Scott, H. H., 157 (Misc.)
 Scott, J. A., 582 (Hel.)
 Seal, S. C., 374 (Chl.)
 —, with Linton & Mitra, (376) (Chl.)
 Seaton, S. P., 517 (Bl.)
 Seckinger, D. L., 701 (Am.), 790 (Mal.)
 Sédan, J., 903 (Oph.)
 —, with Joyeux & Esménard, 135 (Hel.)
 Seetharama Iyer, P. V., with Wright & Pandit, 127 (Hel.)
 Seguin, P. & Vinzent, R., 693 (R.F.)
 —, with — & Daufresne, M., 692 (R.F.)
 Sei, M. T., 26 (K.A.)
 Seki, K., 709 (Dys.)
 Selinger, E., 450 (Oph.)
 Sellards, A. W. & Laigret, J., 618 (Y.F.)
 Sellek, A., with Kouri, 588 (Hel.)
 Sellers, W., with Cauchi & Bunkall, 854 (Mal.)
 Selwyn-Clarke, P. S., 616 (Y.F.)
 Sen, B., with Chopra & Bhattacharya, 519 (Bl.)
 —, with — & Gupta, 795 (Mal.)
 —, with — & Ganguli, 275 (Mal.)
 —, with — & Sen, G., 545 (Am.)
 Sen, G., with — & Sen, B., 545 (Am.)
 Sen, S., with Knowles & Das Gupta, 700 (R.B.F.)
 Senevet, G., 164 (B.R.)
 Sepulcri, P. & de Negri, U., 844 (Mal.)
 Sequeira, J. H., 724 (Misc.)
 de Sequeira, L. A. F., 176 (S.S.)
 Sergeant, A., 694, 695, 696 *bis* (R.F.)
 — & Lévy, H., 348 (R.F.)
 — & Vogt, P., (233) (Mal.)
 Sergeant, E., 243, 281 (Mal.)
 Sergeant, Edm., 499 (K.A.)
 — & Adler, S., 499 (K.A.)
 —, Sergeant, Et., Parrot, L. & Catanei, A., 757 (Mal.)
 Sergeant, Et., 400 *bis* (Sn.)
 — & Catanei, A., 849 (Mal.)
 —, with Sergeant Ed., Parrot & Catanei, 757 (Mal.)
 Serra, G., 969 (Y. & S.)
 Servajean, C., (849) (Mal.)
 Seyberlich, with Calbairac, 369 (Pl.)
 —, with Le Gall & Brault, 874 (Pl.)
 Shahin, M., 34 (Fev.)
 Sharp, N. A. D., 410 (Diet.)
 Sharp, W. B. & Hollar, E., 52 (Fev.)
 Sharrer, B., 58 (R.F.)
 Shattuck, G. C., 510 (K.A.)

- Shelley, H. M., 328 (B.R.)
 Shevtchenko, F. I. & Radzivilovsky, G. L., 507 (K.A.)
 —, with Sofiev, 507 (K.A.)
 Shiga, K., 609 (Lep.)
 Shimomura, H., with Sugio, 863 (Chl.)
 Shirokogorov, J., 264 (Mal.)
 Shope, R. E., 321 (Rab.)
 Shortt, H. E., 319 (Rab.)
 — & Mallick, S. M. K., 387 (Sn.)
 —, Poole, L. T. & Stephens, E. D., 53, (53) (Fev.)
 — & d'Silva, H. A. H., 420 (Fev.)
 —, Sinton, J. A. & Swaminath, C. S., 17 (K.A.)
 — & Swaminath, C. S., 16 (K.A.)
 Shrimpton, E. A. G., 691 (R.F.)
 Shute, P. G., 807 (Misc.), 851 (Mal.)
 —, with James & Nicol, 684 (Mal.)
 Sicault, H. & Nesslerin, H., (777) (Mal.)
 Sicé, A. & Moreau, P., 179 (S.S.)
 — & Robin, C., (779) (Mal.)
 —, — & Mercier, H., 656 (S.S.)
 Siddiqui, M. A., with Chenoy & Abraham, 981 (Y. & S.)
 Sieburgh, G., (762) (Mal.)
 Sigalas, R., with Lande, 577 (Hel.)
 d'Silva, H. A. H., with Shortt, 420 (Fev.)
 da Silva, J. F., with Jorge & Leal, 266 (Mal.)
 Silvers, I. L., with Epstein, 919 (Fev.)
 —, with — & Exemplarskaya, 919 (Fev.)
 Simeons, A. T. W., 796 (Mal.)
 Simić, T., 530, 533 (Am.)
 Simond, P. L., (368) (Pl.)
 Simpson, G. & Anderson, A. S., 291 (Mal.)
 Simpson, I. A., 634 (Misc.)
 Singer, E., 672 (S.S.)
 Sinton, J. A., 238, 688, 752, 753, 760 (Mal.)
 —, with Ghosh, 239 (Mal.)
 — & Harbhagwan, 282 (Mal.)
 —, with Shortt & Swaminath, 17 (K.A.)
 — & Wats, R. C., 255 (Mal.)
 Sitanala, J. B., 934 (Lep.)
 — & Kodyat, R., 934 (Lep.)
 Slot, J. A., 74 (Misc.)
 van Slype, W., 113 (Hel.), 235, 274 (Mal.)
 — & Bouvier, G., 915 (Fev.)
 Smith, C. N., with Bishopp, 485 (Misc.)
 Smith, E. C., 342 (Y.F.), 468 (Misc.)
 Smith, F. C., with Holiday & Kerridge, 478 (Misc.)
 Smith, H. S., 636 (Misc.)
 Smith, R. O. A. & Halder, K. C., 26 (K.A.)
 Smithburn, K. C., with Sabin & Thomas, 302 (Lep.)
 Smithers, D. W., with Dixon, 102 (Hel.)
 Smythe, C. V., with Reiner & Pedlow, 670 (S.S.)
 Snell, A. M., (69) (Sp.)
 Snijders, E. P., 126 (Hel.), 720 (Misc.)
 Snowman, J., 571 (B.R.)
 Soares, J. C., with Mora, 933 (Lep.)
 Sociedad Argentina Patologia Regional del Norte, 570, 971 (B.R.)
 Soda, Y. & collaborators, 373 (Chl.)
 Soegiri, 722 (Misc.)
 Soesilo, R., 247 (Mal.)
 — & Gilbert, A. P. W., 231 (Mal.)
 —, with Walch, 774 (Mal.)
 Sofiev, M. S., 929 (Fev.)
 —, with Chodukin & Kevorkov, 506 (K.A.)
 — & Shevtchenko, F. I., 507 (K.A.)
 Sokhey, S. S. & Maurice, H., 367 (Pl.)
 —, with —, 876 (Pl.)
 Solomon, E., with Grossman, 776 (Mal.)
 Somaliland Protectorate, 751 (Rab.)
 Somasundram, S., 234 (Mal.)
 Sonnenschein, C., 789 (Mal.)
 Soper, F. L., (616) (Y.F.)
 Sorel, 254 (Mal.), 333 (Y.F.)
 Sorley, J. T., 312 (Lep.)
 Souknev, V., Joukow-Werejnikow, N., Faworissowa, B. & Kasanzeva, E., 877 (Pl.)
 Soulage, with Mercier & Fabre, 910 (Fev.)
 Soule, M. H., 306 (Lep.)
 Soulie, P., with Marchal & Roy, 352 (Lept.)
 —, with Poursines & Scandarani, 508 (K.A.)
 South African Institute for Medical Research, 82 (B.R.)
 South African Medical Journal, 175 (S.S.)
 Southern Medical Journal, 280 (Mal.)
 Southern Rhodesia, 951 (Hel.)
 Southwell, T., with Blacklock, 160 (B.R.)
 Souza-Araujo, H. C., 612 (Lep.)
 Spaar, A. E., with Hay & Ludovici, 791 (Mal.)
 Sparrow, H., 45 *bis*, 437, 438 (Fev.)
 —, with Nicolle, 44 *bis*, 48 (Fev.)
 — & Roussel, H., 434 (Fev.)
 Spector, B. K., 535 (Am.)
 Spies, T. D., 409 (Diet.)
 Spindler, A., 303 (Lep.)
 Spink, W. W., 123 (Hel.)
 —, with Theiler & Augustine, 123 (Hel.)
 Spiridion, J. T., (955) (Hel.)
 Spranger, H., 617 (Y.F.)
 Sprawson, C. A., 618 (Y.F.)
 Stabler, R. M., with Wenrich & Arnett, 529 (Am.)
 Stage, H. H., 807 (Misc.)
 Standing, T., with Castellani, (473) (Misc.)
 Stannus, H. S., 110 (Hel.), 410 (Diet.)
 Stanton, A. T., 18 (K.A.)
 Stark, W., 277 (Mal.)
 Statistical Bulletin Metropolitan Life Insurance Company, 858 (Mal.)
 van Steenis, P. B., 65 (Sp.)
 Stefanopoulo, G. J., 619 (Y.F.)
 —, with Findlay, Davey & Mahaffy, 339 (Y.F.)
 Steinberg, I., with Goldwater, Most & Connery, 122 (Hel.)
 Stephens, E. D., with Shortt & Poole, 53, (53) (Fev.)
 Stephenson, D., with Happold, 489 (Misc.)
 Stern, R. O., with Findlay, 340 (Y.F.)
 Stévenel, L. & Berny, P., 111 (Hel.), 301 (Lep.)
 Stewart, J. L., 663 (S.S.)
 Stodola, F. H., with Anderson, Crowder & Newman, 940 (Lep.)
 Stoker, W. J., with Bonne, 231 (Mal.)
 Stones, R. Y., 410 (Diet.)
 Storm, C. J., with de Langen, (234) (Mal.)
 Stott, H., 37 (Fev.)
 Stoyale, J. A. R., 462 (Misc.)
 Strachan, P. D., 295 (Lep.)

Stratman-Thomas, W. K., with Boyd, 842 (Mal.)
 —, with — & Kitchen, 240, 842 *bis* (Mal.)
 —, with — & Muench, 779 (Mal.)
 Strickland, C., 254 (Mal.)
 — & Roy, D. N., 851 (Mal.)
 Stroesco, G., 700 (R.B.F.)
 Stromquist, W. G., 837 (Mal.)
 Sugino, K., 377 (Chl.)
 Sugio, K. & Shimomura, H., 863 (Chl.)
 Sumi, I. & Inoue, K., 533 (Am.)
 Sung, C. H., with Yang, 708 (Dys.)
 Svensson, R., 412 (B.R.)
 Swaminath, C. S., with Shortt, 16 (K.A.)
 —, with — & Sinton, 17 (K.A.)
 Swartzwelder, J. C., with Faust, 547 (Am.)
 Sweeney, M. A., with Walker, 301 (Lep.)
 Sweet, W. C., with Jacobs & Kendrick, 112 (Hel.)
 Swellengrebel, N. H., 221, 284 (Mal.)
 —, with de Buck, 241 *bis*, 242 (Mal.)
 —, with Kraan & de Buck, 288 (Mal.)
 Swezy, W. W., 278 (Mal.)
 Sydenstricker, V. P. & Vryonis, G. P., 226 (Mal.)
 Symes, C. B., 343, (618) (Y.F.), 651 (S.S.)

T.

Tai, T. Y., with Loh, 860 (Chl.)
 Tajimi, T., 948 (Hel.)
 Tajiri, I., 609, 936 (Lep.)
 Takahara, K., with Kuo, Adachi & Saito, 627 (Misc.)
 Takasaki, J., 550 (Hel.)
 Takino, M. & Miyake, S., 608 (Lep.)
 Talbot, S. B., 554 (Hel.)
 —, with Cort, 554 (Hel.)
 Talec, 356 (R.B.F.)
 Taliaferro, W. H. & Pavlinova, Y., 671 (S.S.)
 Talukder, M., 477 (Misc.)
 Tamura, S., 46 (Fev.)
 Tanner, N.C. & Hewlett, R. F. L., 264 (Mal.)
 Tao, C. S., 949 (Hel.)
 —, with Komiya & Kawana, 948 *quat.* (Hel.)
 —, Yu, T. H., Chu, P. J. & Wang, C., 87 (Hel.)
 Tao, S. C., with Komiya & Kawana, 558 (Hel.)
 Taylor, E. L., 86, 105 (Hel.)
 Taylor, J. & Ahuja, M. L., 375 (Chl.), 387 *bis* (Sn.)
 —, — & Gurkirpal Singh, 377 (Chl.)
 — & Mallick, S. M. K., 387 (Sn.)
 Tebbutt, A. H., with Hughes & Diethelm, 914 (Fev.)
 — & Warden, D. A., 914 (Fev.)
 Teichler, G., 593 (Hel.)
 Ten Bokkel Huinink, A., 709 (Dys.)
 Teng, C. T., with Zia, 28 *bis* (K.A.)
 Tewari, M., 867 *bis* (Chl.)
 Theiler, H. & Augustine, D. L. (592) (Hel.)
 —, — & Spink, W. W., 123 (Hel.)
 Theiler, M., with Lloyd & Ricci, 623 (Y.F.)
 Theodor, O., 445 (Fev.)
 —, with Adler & Schieber, 693 (R.F.)
 Thomas, R. M., with Sabin & Smithburn, 302 (Lep.)
 Thomas, W. L. & Keys, S., 776 (Mal.)

Thornton, E. N., 358 (Pl.), 422 (Fev.), 769 (Mal.), 868, 869 (Pl.)
 Thygeson, P., Proctor, F. I. & Richards, P., 450 (Oph.)
 Tiflow, W., with Sassuchin & Ioff, (879) (Pl.)
 Tihon, L., 308 (Lep.)
 Tikhomirova, M., 367 (Pl.)
 —, Sagorskaja, M. & Iljin, B., (368) (Pl.)
 Timbres, H. G., 759 (Mal.)
 Timpano, P., 116 (Hel.)
 — & Castorina, G., 710 (Dys.)
 Tisseuil, J., 593 (Hel.) 603 (Lep.)
 — & Berney, P., (301) (Lep.)
 To, S. & Ko, B., 561 (Hel.)
 — & Kyu, K., 546 (Am.)
 Tokura, N., 55 (R.F.) 198 (S.S.), 490 (Misc.)
 Tolentino, J. G., 297, (605), 943 (Lep.)
 — with Rodriguez & Mabalay, (601) (Lep.)
 Tonking, H. D., 115 (Hel.), 724 (Misc.)
 —, with Roberts, 632 (Misc.)
 Topley, W. W. C. & Wilson, G. S., 971 (B.R.)
 Torrealba, J. F., (676) (S.S.)
 Torres, S., 743 (Rab.)
 — & Lima, E. de Q., 743 (Rab.)
 Totze, R., 138 (Der.)
 Toullec, F., with Haslé & Vaucel, 61, 353 (Lept.)
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